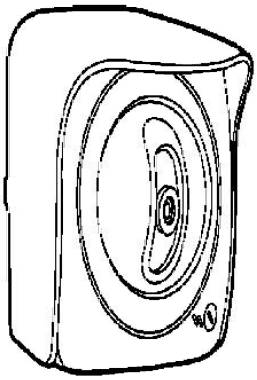
ORDER NO. KMS0502050CE

# Service Manual

## Network Camera

## BB-HCM331CE / BB-HCM331E

(for Europe)





**IMPORTANT INFORMATION ABOUT LEAD FREE, (PbF), SOLDERING**
**If lead free solder was used in the manufacture of this product the printed circuit boards will be marked PbF.**
**Standard leaded, (Pb), solder can be used as usual on boards without the PbF mark.**
**When this mark does appear please read and follow the special instructions described in this manual on the use of PbF and how it might be permissible to use Pb solder during service and repair work.**

# 1. ABOUT LEAD FREE SOLDER (PbF: Pb free)

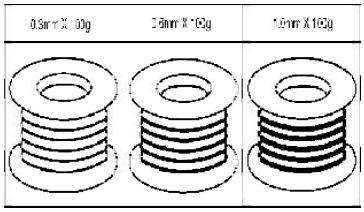
**Note:**
**In the information below, Pb, the symbol for lead in the periodic table of elements, will refer to standard solder or solder that contains lead.**
**We will use PbF solder when discussing the lead free solder used in our manufacturing process which is made from Tin, (Sn), Silver, (Ag), and Copper, (Cu).**
**This model, and others like it, manufactured using lead free solder will have PbF stamped on the PCB.**
**For service and repair work we suggest using the same type of solder although, with some precautions, standard Pb solder can also be used.**

**Caution**

- **PbF solder has a melting point that is 50° ~ 70° F, (30° ~ 40°C) higher than Pb solder. Please use a soldering iron with temperature control and adjust it to 700° ± 20° F, (370° ± 10°C). In case of using high temperature soldering iron, please be careful not to heat too long.**
- **PbF solder will tend to splash if it is heated much higher than its melting point, approximately 1100°F, (600°C).**
- **If you must use Pb solder on a PCB manufactured using PbF solder, remove as much of the original PbF solder as possible and be sure that any remaining is melted prior to applying the Pb solder.**
- **When applying PbF solder to double layered boards, please check the component side for excess which may flow onto the opposite side (See figure, below).**

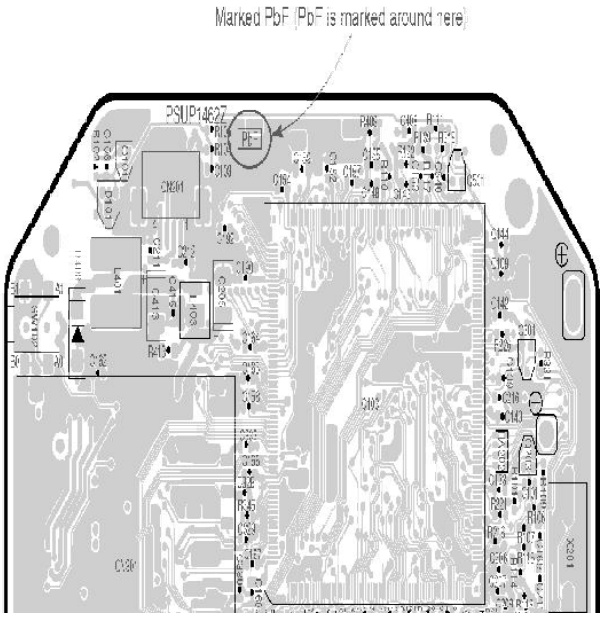
## 1.1. SUGGESTED PbF SOLDER

**There are several types of PbF solder available commercially. While this product is manufactured using Tin, Silver, and Copper, (Sn+Ag+Cu), you can also use Tin and Copper, (Sn+Cu), or Tin, Zinc, and Bismuth, (Sn+Zn+Bi). Please check the manufacturer's specific instructions for the melting points of their products and any precautions for using their product with other materials. The following lead free (PbF) solder wire gauge are recommended for service of this product: 0.3mm, 0.6mm and 1.0mm.**

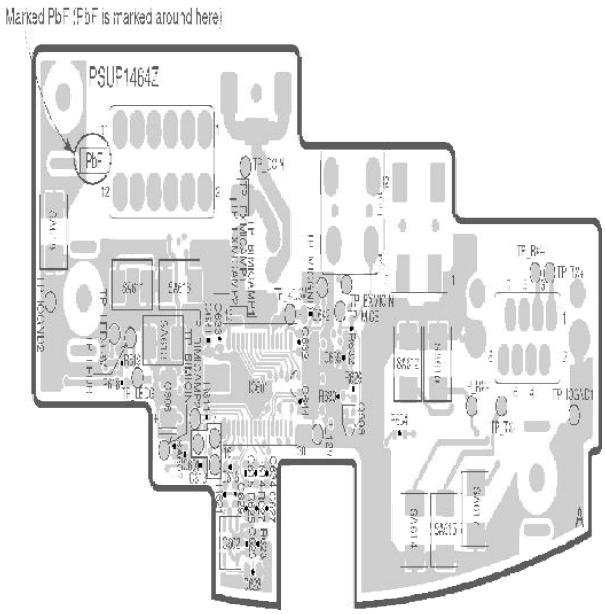


## 1.2. HOW TO RECOGNIZE THAT Pb FREE SOLDER IS USED

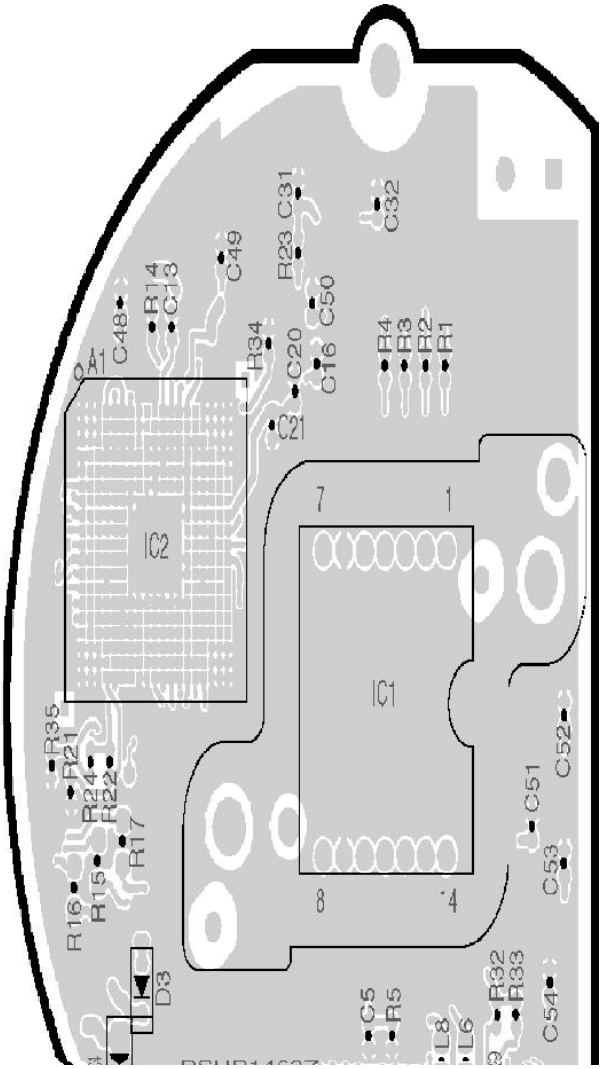
**MAIN BOARD**



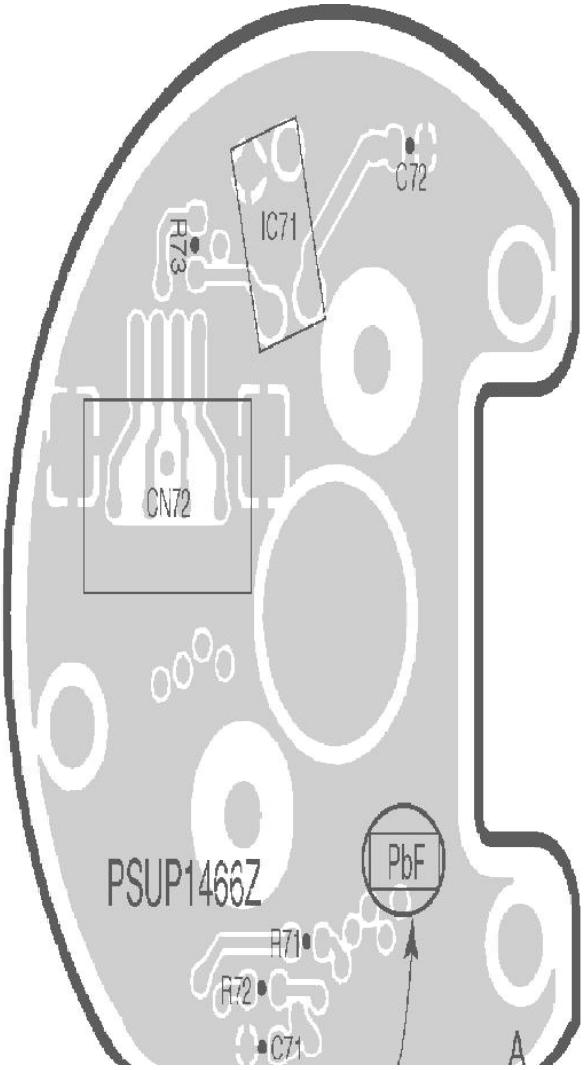

**I/O BOARD**




**CAMERA BOARD**




**SENSOR BOARD**




# 2. FOR SERVICE TECHNICIANS

**ICs and LSIs are vulnerable to static electricity.**
**When replacing, the following precautions will help to prevent recurring malfunctions.**

**1. Cover the plastic parts with aluminum foil.**

**2. Ground the soldering irons.**

**3. Use a conductive mat on the work-table.**

**4. Do not grasp IC or LSI pins with bare fingers.**

# 3. CAUTION

## 3.1. SAFETY PRECAUTIONS

1. Before servicing, unplug the power cord to prevent an electrical shock.
2. When replacing parts, use only manufacturer's recommended components for safety.
3. Check the condition of power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, make the following insulation resistance test to prevent a shock hazard.

3 VORSICHT

3.1. SICHERHEITSHINWEISE

1. Vor Reparaturen stets das Netzkabel abziehen, um Stromschlaggefahr zu vermeiden.
2. Aus Sicherheitsgründen ausschließlich vom Hersteller empfohlene Ersatzteile verwenden.
3. Den Zustand des Netzkabels prüfen und bei erkennbarer Abnutzung oder Beschädigung ersetzen.
4. Nach der Reparatur Kabelummantelung, Isolierschichten, Papierisolierung, Abschirmung usw. wieder anbringen.
5. Vor der Rückgabe des reparierten Gerätes an den Kunden die folgende Isolationswiderstandsprüfung durchführen, um ein Stromschlagrisiko auszuschließen.

## 3.2. BATTERY CAUTION

**Danger of explosion if the battery is replaced incorrectly. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's Instructions.**
**The lithium battery is a critical component (type No. BR-2032-1VC). Please observe for the proper polarity an the exact location when replacing it and soldering the replacement lithium battery in.**

## 3.3. TRADEMARKS

- Adobe, Acrobat and Reader are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States and/or other countries.
- Ethernet is either a registered trademark or a trademark of Xerox

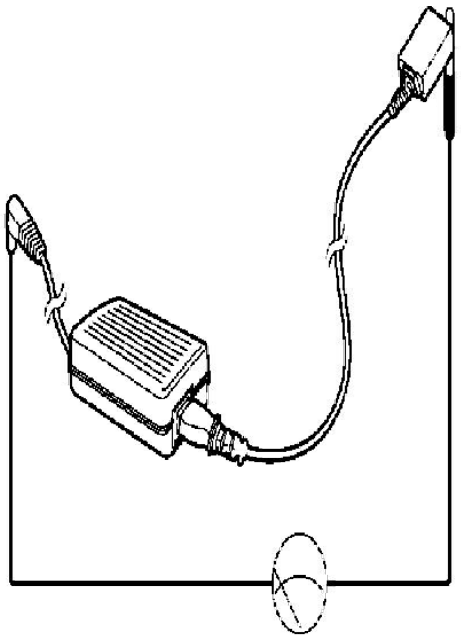
Corporation in the United States and/or other countries.
- Microsoft, Windows and ActiveX are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
- Pentium is a trademark or registered trademark of Intel Corporation or its subsidiaries in the United States and other countries.
- SD mark is a trademark of the SD Card Association.
- Screen shots reprinted with permission from Microsoft Corporation.
- All other trademarks identified herein are the property of their respective owners.

## 3.4. INSULATION RESISTANCE TEST

1. Unplug the AC power cord and short the two prongs of the plug with a jumper wire.
2. Measure the resistance value with ohmmeter between the jumpered AC plug and each exposed metal cabinet part, such as screw threads, etc.

**Note:**
**Some exposed parts may be isolated from the chassis by design. These will read infinity.**

3. If the measurement is outside the specified limits, there is a possibility of shock hazard. The equipment should be repaired and rechecked before it is returned to the customer.



Ohm meter

Resistance = more than 10MΩ (at DC 500 V)

3.4. ISOLATIONSWIDERSTANDSPRÜFUNG

1. Das Netzkabel abziehen und die beiden Stifte des Steckers mit einer Drahtbrücke verbinden.
2. Mittels eines Ohmmeters den Widerstand zwischen dem überbrückten Netzstecker und allen freiliegenden Metallteilen des Gehäuses wie Schrauben, Gewinde, usw. messen.

Hinweis:

Einige der freiliegenden Teile können konstruktionsbedingt vom Gehäuse isoliert sein. Diese ergeben dann unendliche Messwerte.

## 3.5. POWER CAUTION

**The power socket wall outlet should be located near this equipment and be easily accessible.**

## 3.6. PRECAUTIONS FOR USERS IN THE UNITED KINGDOM

**FOR YOUR SAFETY, PLEASE READ THE FOLLOWING TEXT CAREFULLY.**
**This appliance is supplied with a moulded three pin mains plug for your safety and convenience. A 3 amp fuse is fitted in this plug. Should the fuse need to be replaced, please ensure that the replacement**

**fuse has a rating of 3 amps and that it is approved by ASTA or BSI to BS1362.**

**Check for the ASTA mark**  **or the BSI mark**  **on the body of the fuse.**

**If the plug contains a removable fuse cover, you must ensure that it is refitted when the fuse is replaced. If you lose the fuse cover, the plug must not be used until a replacement cover is obtained. A replacement fuse cover can be purchased from yourlocal Panasonic Dealer.**
**IF THE FITTED MOULDED PLUG IS UNSUITABLE FOR THE SOCKET OUTLET IN YOUR HOME THEN THE FUSE SHOULD BE REMOVED AND THE PLUG CUT OFF AND DISPOSED OF SAFELY. THERE IS A DANGER OF SEVERE ELECTRICAL SHOCK IF THE CUT OFF PLUG IS INSERTED INTO ANY 13 AMP SOCKET.**
**If a new plug is to be fitted, please observe the wiring code as shown below. If in any doubt, please consult a qualified electrician.**
**IMPORTANT: THIS APPLIANCE MUST BE EARTHED.**
**How to replace the fuse: The wires in this mains lead are coloured in accordance with the following code:**

**Blue: Neutral**
**Brown: Live**

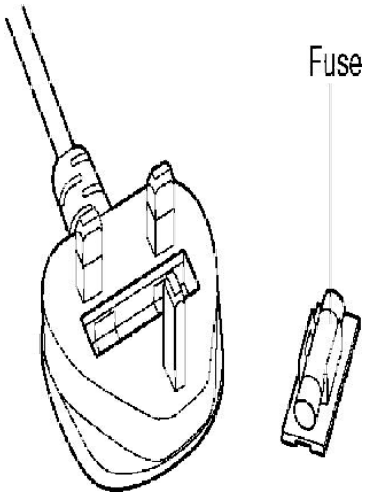
**As the colours of the wire in the mains lead of this appliance may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows.**

**The wire which is coloured BLUE must be connected to the terminal in the plug which is marked with the letter N or coloured BLACK.**
**The wire which is coloured BROWN must be connected to the terminal in the plug which is marked with the letter L or coloured RED.**
**Under no circumstances should either of these wires be connected to the earth terminal of the three pin plug, marked with the letter E or the Earth symbol** ⏚**.**

**How to Replace the Fuse**

## 1. Insert the flathead screwdriver into the groove either end of the fuse carrier.

## 2. Detach the fuse carrier and change the fuse.



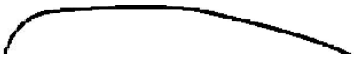

**3. Replace the fuse into the fuse carrier and resecure into the mains plug.**

## 3.7. CLEANING

**After the camera is turned off by disconnecting the AC plug, clean the camera.**

### 3.7.1. Cleaning the Main Unit

**If the lens cover has the sand or the dust, image quality may decrease. After taking away the sand or the dust on it, wipe it with a dry cloth.**



**Note:**

- **Do not use alcohol, polishing powder, cleanser, benzine, thinner, wax, petroleum products or hot water to wipe the camera. Also avoid glass cleaner, pesticide or hair spray. They may cause change in the shape or color.**
- **Do not directly touch the lens cover. Your fingerprints can cause the image to be out of focus.**
- **Do not directly pour the water with a hose to wash the unit or the lens cover.**

# 4. SPECIFICATIONS

### Network Camera

| Items | Specifications |
|---|---|
| Pan/Tilt Angle | Pan: -60° to +60°, Tilt: -45° to +20° |
| Number of Pixels | 1/4-inch CCD Sensor 320,000 pixels |
| Illuminance | 3-100,000 lx (0.2-100,000 lx in color night view mode) |
| White Balance | Auto/Manual/Hold |
| Focus | Fixed 0.5m (20 inches) - Infinity |
| Caliber Ratio (F No.) | F3.5 |
| Horizontal Viewing Angle | 53° |
| Exposure | Auto |

### Other Specifications

| Items | Specifications |
|---|---|
| Splash Resistant Standard | IPX4 |
| Video Compression | JPEG (3 Levels) |
| Video Resolution | 640 x 480, 320 x 240 (default), 160 x 120 |
| Buffered Image *1 | About 125 frames (320 x 240) with time display<br>(In case SD momory card is not inserted.) |
| Audio Communication | 2-way Half Duplex |
| Audio Bandwidth | 300 Hz-3.4 KHz |
| Audio Play Method | Play with ActiveX |
| Input Encoding Method | Encoding with ActiveX |
| Audio Input | Built-in Microphone or External Microphone Input Terminal |
| Audio Output *2 | Audio Line Output Terminal for External Speaker |
| Frame rate *3 | Max.12 frames/second (640 x 480)<br>Max.30 frames/second (320 x 240 or 160 x 120) |

| Items | Specifications |
|---|---|
| Supported Protocols | IPv4/IPv6 Dual-Stack<br>-IPv4:<br>TCP, UDP,IP, HTTP, FTP, SMTP, DHCP, DNS, ARP, ICMP, POP3, NTP, IPsec, UPnP<br>-IPv6:<br>TCP, UDP, IP, HTTP, FTP, SMTP, DNS, ICMPv6, POP3, NDP, NTP, IPsec |
| IPsec Feature | ESP Encryption, ESP Authentication<br>Transport mode/T nnel mode<br>IKE (Internet Key Exchange) |
| IKE (Internet Key Exchange) | Pre-Shared Key |
| Cipher Algorithm | DES-CBC, 3DES-CBC, AES-CBC |
| Message-Digest Algorithm | HMAC-MD5, HMAC-SHA-1 |
| Message Transfer Condition | Alarm or Timer |
| Image Transfer Method | SMTP, FTP |
| Interface | 10Base-T/100Base-TX Ethernet RJ-45 connector x 1 |
| Indicator Display | Power/Network Communication/Camera operation/Ethernet link |
| External Microphone Input | 3.5 mm Mini Jack |
| Audio Output | 3.5 mm Stereo Mini Jack (But output is mono.) |
| External I/O | External Sensor Input x 2<br>External Sensor Output x 1 |
| SD Memory Card Slot | Full Size |
| Dimension (HWD) | About 100 mm (3.94 inches) x About 100 mm (3.94 inches) x About 73.5 mm (2.89 inches) |
| Weight | 310 g (0.68 lb.) (Only the unit) |
| Power Supply | AC adaptor: Input 100-240 V AC, 50/60 Hz<br>Consumption: About 3 W (6 W during pan/tilt scan) |
| Temperature | Operation: -20 °C (-4 °F) to +50 °C (+122 °F)<br>Storage: -25 °C (-13 °F) to +60 °C (+140 °F) |
| Humidity | Operation: 20%-90% (No Condensation)<br>Storage: 20%-90% (No Condensation) |

***1) The maximum number of frames changes depending on the image quality and what object you buffer.**
***2) Connect it to an amplifier or an external speaker with a built-in amplifier.**
***3) Frame rate may slow down depending on the network environment, the PC performance, the image quality, enabling IPsec, SD memory recording or what object you view.**

# 5. MAIN FEATURES

**Splash Resistant body for indoor and outdoor use**
**Your Panasonic Network Camera has a splash resistant body. The splash resistant body allows the camera to be used indoors or outdoors.**

**IPv6*1 Network Camera**

**Your Panasonic Network Camera supports IPv6 (Internet Protocol Version 6), IPv6 was created to address the additional IP addresses that will be needed as the Internet continues to expand. Since the camera also supports IPv4 that's currently used, it is "dual stack" design will seamlessly operate while IPv6 is phased in. For more information in IPv6 you wish to visit http://www.ipv6.org/. See the Operating Instructions for more information.**

**Audio 2-way Communication*2 (Walkie-talkie Type)(IPv4 Only)**

**Your Panasonic Network Camera now provides 2-way audio, between the camera and your PC. You will be able to hear the person on camera and respond using a microphone connected to your PC's sound card (customer-provided.) They will hear your response through the amplified speaker (customer-provided) connected to the camera. The audio feature uses a Java applet that is installed during the installation procedure.**

**For example, the camera can be used in the following various locations:**

- **In the baby's room, to hear if the baby is crying.**
- **At the front door, to see and hear who is at the door.**
- **In the children's play room, to see and hear if they are safe.**

**Note:**

**PLEASE NOTE that under certain circumstances, audio/video recording may be PROHIBITED by law. This device should be used only in compliance with all applicable federal, state and local statutes.**

**Better Image Quality**

**The CCD sensor and the color night view mode provides better image quality and low light performance.**

- **The CCD sensor gives you clear image.**
- **You can monitor live video (Motion JPEG) that refreshes its image 30 frames per second.**
- **Color night view mode allows you to monitor the camera in low illuminance.**

**Various Camera Control Features**

**The camera pans or tilts fast in maximum 80° per second. (The previous model: 21° per second) You can control the camera at high speed from your PC or mobile phone. Alarm position feature also allows the camera to automatically turn the lensto the alarm position. Additionally, the following control features are available to easily and quickly monitor the camera.**

**Click to Center...When you click a certain point on the camera image, the point is centered on the image.**
**Preset Position...You can register 8 preset positions. When you click each button, the image switches to its position.**
**Output Control...You can control the external devices (Open or Short to GND) (E.g., turning the light on or ringing a buzzer).**

**SD Memory Card*3 Recording**
**The camera has an SD memory card slot. You can record camera images to the SD memory card. If you enable alarm buffer/transfer, you can record the image at the timing of signal detection of door sensor or light. About 58,000 images (320 x240 resolution and standard quality) can be recorded to 1 GB SD memory card. If you enable 1-minute interval timer buffer/transfer, you can record the images for about 41 days.**

**Enhanced Multi-Camera Page**
**Multi-Camera page displays up to 4 cameras while supporting each audio 2-way communication. The previous model displays only 4 cameras, but this camera can switch 3 sets of 4 cameras. Additionally, the camera can displays maximum 12 cameras on a page in a static image.**

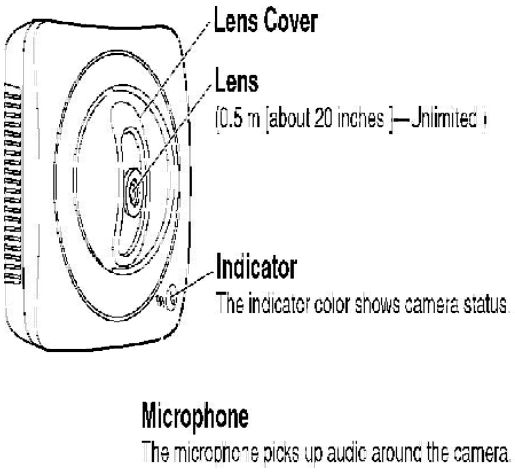
**Supporting Viewnetcam.com service**
**Viewnetcam.com service allows you to access the camera over the Internet with your favorite domain name (E.g., bob.viewnetcam.com) instead of a global IP address.**

**Multi-Language Display**
**Top page, Single Camera and Multi-Camera page can be displayed in English, French, German, Italian, Spanish, Russian, Simplified Chinese or Japanese. The Setup, Maintenance and Support pages are displayed only in English or Japanese.**

***1 To connect in IPv6, subscribe to the ISP's "IPv4/IPv6 Dual-Stack" or "IPv6 over IPv4 Tunneling" service. The camera does not work in IPv6-only network.**
***2 Audio feature does not work on mobile phones. Talk button and Listen button cannot be used simultaneously. It will be supported by the firmware update in the future. In consequence of traffic and network environments, the audio may be delayed or may break up.**
***3 SD memory card is sold separately. The camera supports 1 GB, 512 MB, 256 MB, 128 MB or 64 MB Panasonic SD memory card.**

# 6. PARTS LOCATIONS

## 6.1. FRONT VIEW

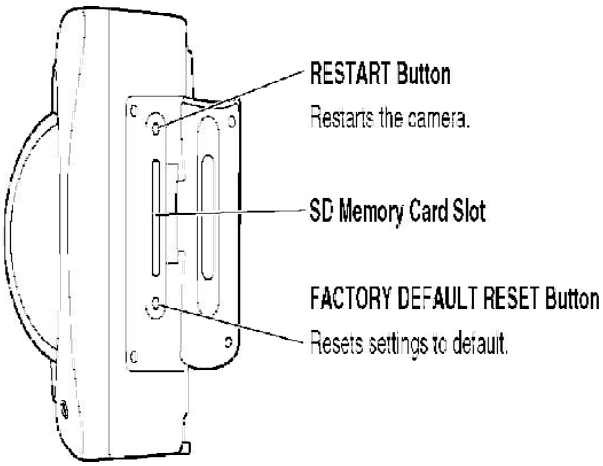



**Indicator Display**

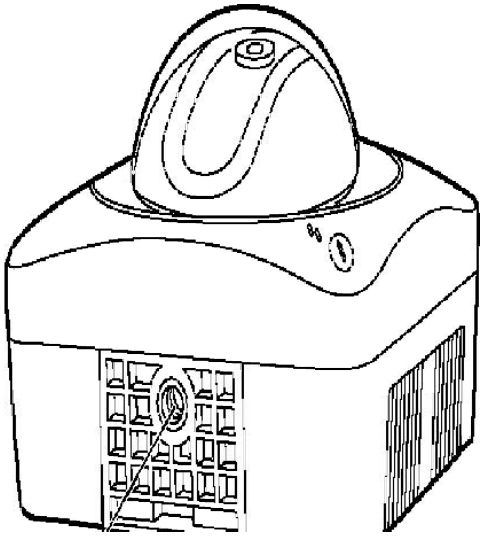
| | | |
|---|---|---|
| **Power on** | **Not on the LAN** | **Orange blinking** |
| | **On the LAN** | **Orange → Green blinking<br>Green** |
| **Normal Operation *1** | | **Green** |
| **Automatic Setup** | **Setting** | **Green blinking** |
| | **Finished setting** | **Green blinking → Green** |
| **Using DHCP** | **Getting IP address *2** | **Green blinking** |
| | **Got IP address** | **Green** |
| **Updating Firmware** | | **Orange blinking** |
| **Pressing FACTORY DEFAULT RESET button** | | **Orange blinking → Turning off<br>(The camera restarts after that.)** |
| **UPnP Failure** | | **Orange blinking (About a 2-second interval)** |
| **Internal Failure** | | **Red blinking *3** |

***1) The indicator turns orange if the camera is not connected to the LAN.**
***2) The indicator blinks orange if the camera is not connected to the LAN.**
***3) See the Installation/Troubleshooting.**

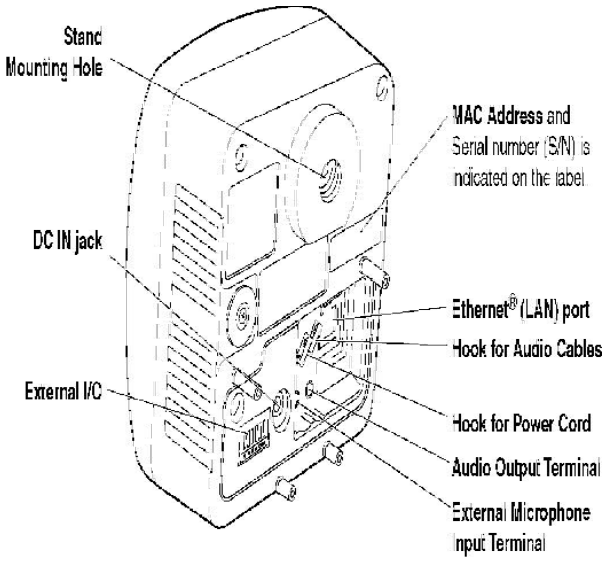
## 6.2. SIDE VIEW




## 6.3. BOTTOM VIEW



## 6.4. REAR VIEW




**Note:**
**To listen to audio from the camera, an external amplified speaker (customer-provided) must be connected to the camera. The connector used is a stereo type, similar to that used by amplified PC speakers. Though the connector is stereo, the audio is not.**

# 7. CONNECTING YOUR NETWORK CAMERA

## 7.1. PREPARATION

**Prepare the following before connecting the Network Camera.**

**- Set up software (Setup CD-ROM)**
**- PC to fulfill the system requirements.**
**- Ethernet Router for LAN Connection.**
**- Ethernet cable (two pieces of Category 5 straight cable).**

**System Requirements**
**Your PC (Personal Computer) and network must meet the following technical specifications for the camera to work properly.**

| Item | Description |
|---|---|
| Operation System | Microsoft ® Windows ® XP<br>Microsoft ® Windows ® 2000<br>Microsoft ® Windows ® Me<br>Microsoft ® Windows ® 98SE |
| CPU | -For viewing single camera<br>Pentium ® III (800 MHz or greater is recommended.)<br>-For viewing multiple cameras<br>Pentium 4 (1.8 GHz or greater is recommended.) |
| Protocol | TCP/IP protocol (HTTP, TCP, UDP, IP, DNS, ARP, ICMP) |
| Interface | 10/100 Mbps network card installed |
| Web Browser | Internet Explorer 6.0 or later (Not included on the Setup CD-ROM) |
| Audio | Audio input/output feature (Microphone or speaker) |

**For IPv6 Connection**

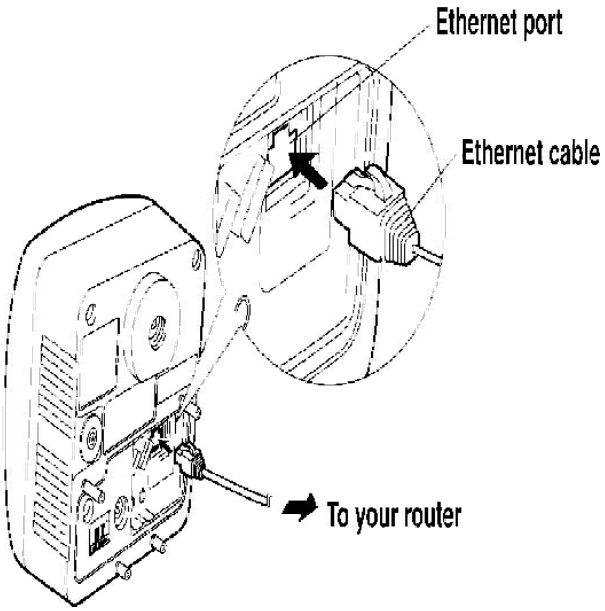
| Item | Description |
|---|---|
| Operation System | Microsoft ® Windows ® XP Service Pack 1 or later |
| CPU | -For viewing single camera<br>Pentium III (800 MHz or greater is recommended.)<br>-For viewing multiple cameras<br>Pentium 4 (1.8 GHz or greater is recommended.) |
| Protocol | TCP/IP protocol (HTTP, TCP, UDP, IP, DNS, ICMPPv6, NDP) |
| Interface | 10/100 Mbps network card installed |
| Web Browser | Internet Explorer 6.0 or later (Not included on the Setup CD-ROM) |
| Audio | Audio input/output feature (Microphone or speaker) |

**Note:**
**See Panasonic Network Camera support website at http://panasonic.co.jp/pcc/products/en/netwkcam/ for details about network environment.**

## 7.2. CONNECTING THE CAMERA TO YOUR ROUTER

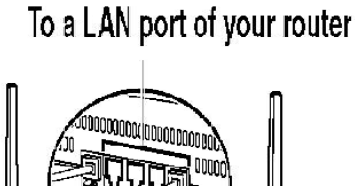
**Connect the camera to your router with an Ethernet cable to set up the camera.**

### 1. Connect the Ethernet cable (customer-provided) to the camera.




**Note:**
**These instructions assume your PC is already connected to the Internet and your network includes a router.**

## 2. Connect the Ethernet cable to your router.

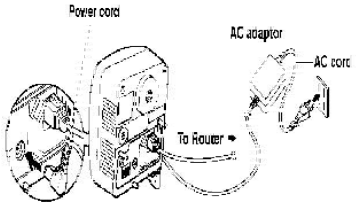



## 3. Connect the AC adaptor cord to the DC In jack, and plug the AC cord into the outlet.

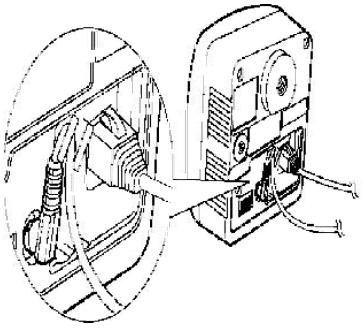
**- The AC cord is used as the main disconnect device, ensure that**

the socket-outlet is located/installed near the equipment and is easily accessible.

- Use only specified Panasonic AC adaptor PQLV202 (Order No. PQLV202W).
- If the indicator does not light green, see the Installation/ Troubleshooting.
- A noise can be heard during pan/tilt operation. This is normal.




4. Hook the power cord to the Hook for Power Cord.



## 7.3. SETTING UP THE CAMERA TO VIEW ON THE LAN

**Setup CD-ROM allows you to easily set up the camera.**

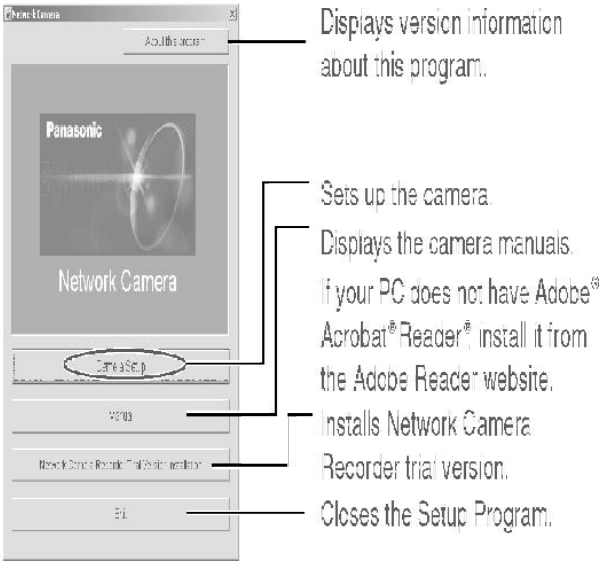
**Note:**

- To avoid any possible problems, temporarily disable any firewall or antivirus software.
- This procedure explains installation of the camera on the same network that your PC is part of.
- Before proceeding, close your web browser.
- See the Operating Instructions on the Setup CD-ROM for details.

**1. Insert the Setup CD-ROM into the CD-ROM drive of the PC.**

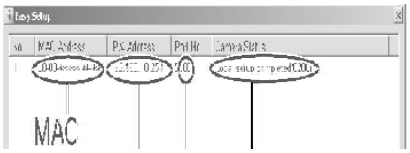
- The window is automatically displayed.
  (If the Network Camera Setup window is not displayed automatically, double-click "Setup.exe" file on the Setup CD-ROM.)

**2. Click [Camera Setup].**




**3. Select the camera to set up and click [Execute].**

**- This program searches for the cameras that are connected to the router and displays the MAC Addresses, IP addresses and Port Numbers.**



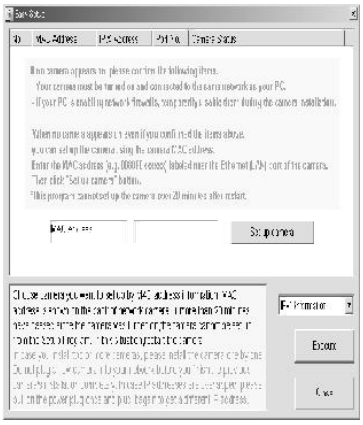

**- The MAC Address on the rear side of the camera shows which camera you select on the Camera List window.**

**Note:**

**- If more than 20 minutes have passed since the camera was turned on, the camera cannot be set up from the Setup Program. In this situation, disconnect the power cord from the outlet, and reconnect it again.**

**- The Setup Program may not list any cameras due to your firewall or**

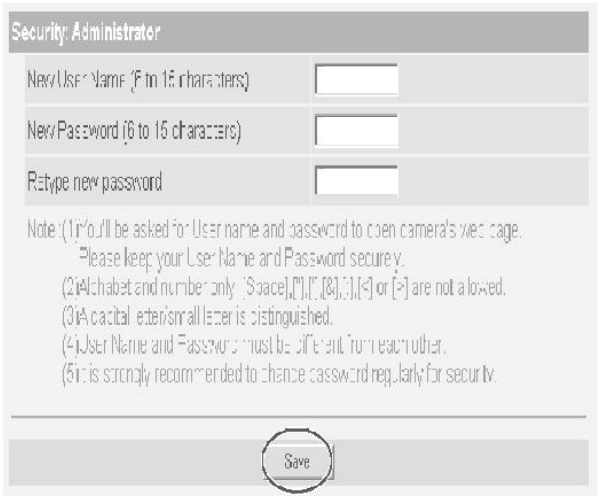
**antivirus software settings on your PC. If you cannot disable your firewall or antivirus software, you can set up the camera entering the camera MAC address on the following window. The camera's MAC address can be found on the label affixed to the back of each camera.**



**4. Click [Automatic Setup (Local Access Only)].**


**- For the first time installation or after pressing the FACTORY DEFAULT RESET button, only [Automatic Setup (Local Access Only)] can be selected. To set up the camera with Static or DHCP settings, after performing the [Automatic Setup (Local Access Only)], run the Setup Program again and select [Manual Setup].**

**5. Enter the user name and password you wish to use, and click [Save].**




**6. Enter the name and password that were entered above, and click [OK].**


**7. When the Single Camera page is displayed, the setup is completed.**

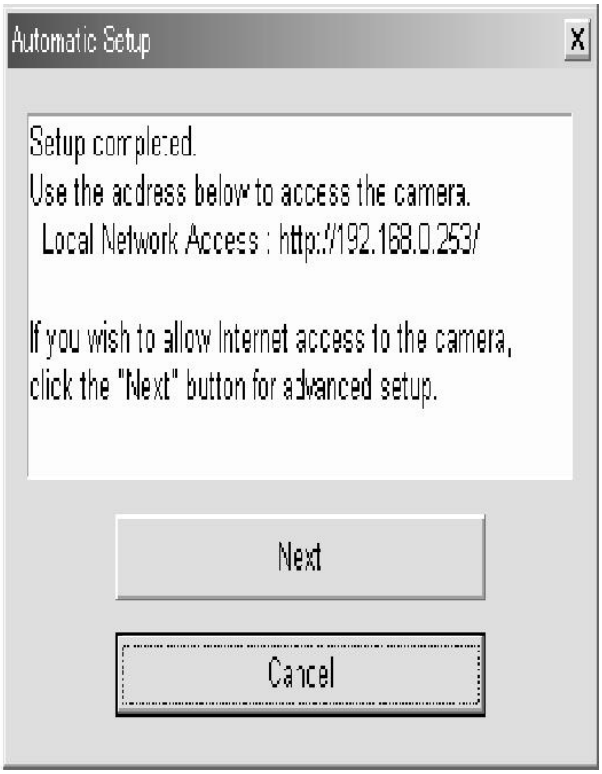
**- When Security Warning window is displayed, click [Yes].**

**- When Warning -Security window is displayed, click [Always]**


**Note:**
**To insure that the most current image is displayed, Internet Explorer should be configured as follows.This will not have any negative result on normal use.**

1. **While viewing any website, Click [Tools] [Internet Options].**
2. **In the section "Temporary Internet Files", click [Settings] and check [Every visit to the page].**

**To enable Internet access to the camera**
**Click [Next] to set up the Internet access to the camera and go to step 3 on the page 21 of the Installation/Troubleshooting.**




**- If you do not allow the Internet access, click [Cancel], and go to page 31 of the Installation/Troubleshooting to confirm the camera image.**

# 8. DISASSEMBLY INSTRUCTIONS

## 8.1. HOW TO REMOVE MAIN BOARD AND I/O BOARD

| | |
|---|---|
| **1. Remove four Screws (B).**<br>**2. Remove Cabinet Cover.** | |

| | |
|---|---|
| **3. Remove three Screws (A).**<br>**4. Remove Main Board and I/O Board from Cabinet Body.**<br>**5. Remove Connector A, Connector B and Connector C.** | |
| **6. Remove FFC Cable from Main Board and I/O Board.** | |

## 8.2. HOW TO REMOVE LENS UNIT AND SENSOR BOARD

| | |
|---|---|
| **1. Remove four Screws (B).**<br>**2. Remove Cabinet Cover.** | |
| **3. Remove three Screws (A).**<br>**4. Remove Main Board and I/O Board from Cabinet Body.**<br>**5. Remove Connector A, Connector B and Connector C.** | |

| | |
|---|---|
| **6. Remove two Screws (A).**<br>**7. Remove Pan Motor Unit, Pan Gear and Eye Block from Cabinet Body.** | |
| **8. Remove four Screws (D).**<br>**9. Remove Tilt Motor Unit.** | |
| **10. Remove two Screws (D).**<br>**11. Remove Eye Left Cover, Lens Block and Eye Center Cover from Eye Right Cover.** | |

| | |
|---|---|
| **12. Remove two screws (D).**<br>**13. Remove Lens Unit from Lens Cover.** | |
| **14. Remove FPC Tape and CORE Tape from Eye Right Cover.** | |

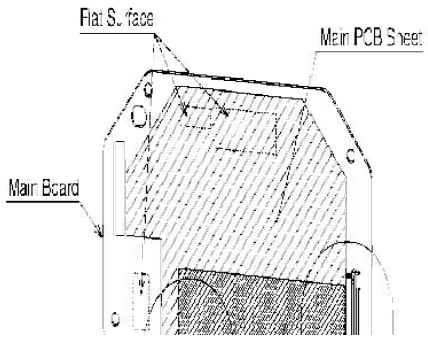
| | |
|---|---|
| **15. Pull Connector B and remove Tilt Motor Unit.** | |
| **16. Remove two Screws (D).**<br>**17. Remove Sensor Board and Filter from Eye Right Cover.** | |

| | |
|---|---|
| **18. Remove Sensor Board from FPC Cable.** | |

# 9. THE CAUTIONS AT THE TIME OF ASSEMBLY

## 9.1. CAUTIONS FOR SHEET ATTACHMENT

**Attach the Main PCB Sheet to the Main Board and then attach the Plastic Parts to it.**

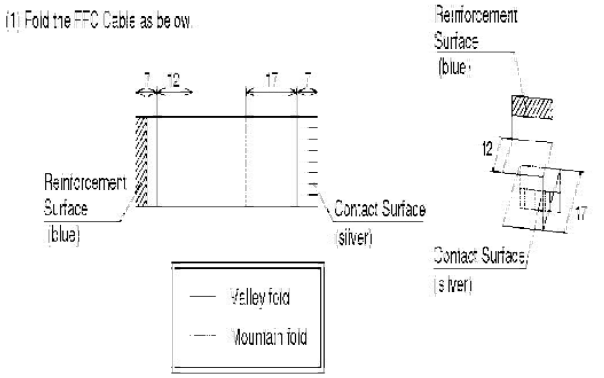


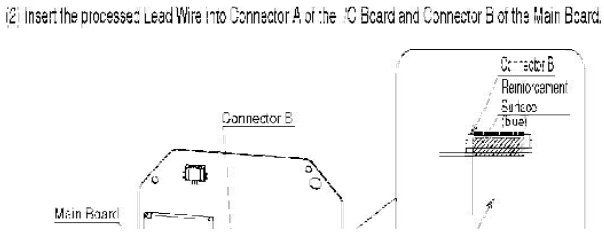

**Caution:**

**See the Figures for the position in the attachment of the Main PCB Sheet and the Sheet.**
**Press the Flat Surface shown in the Figure, then press the whole sheet securely to avoid peeling.**
**The Sheet should not cover the connector in FIG. 2.**

## 9.2. CAUTIONS FOR FFC CABLE ATTACHMENT

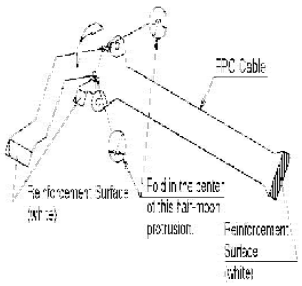
**Process the FFC Cable to insert to the connectors of the I/O Board and the Main Board.**



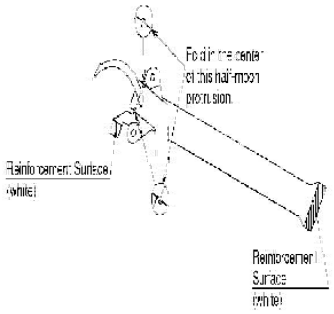

## 9.3. CAUTIONS FOR FPC ATTACHMENT

1. Fold the FPC Cable in the direction of the arrow in the position of the half-moon top protrusion (chain line) as shown below.

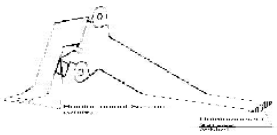



**Caution:**
When folding the FPC, be careful not to damage it.

2. Fold back the FPC Cable in the direction of the arrow in the position of the half-moon top protrusion (chain line) as shown below.

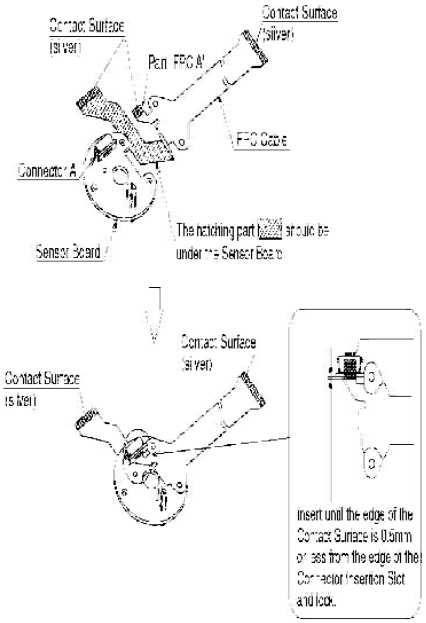



3. Completion of folding.

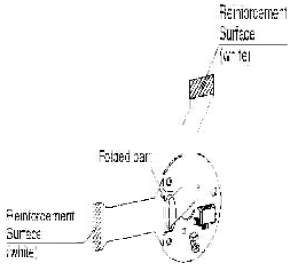


4. Attach the FPC Cable to the Sensor Board.

(1) Insert Part FPC A of the FPC Cable into Connector A of the Sensor Board and lock it.

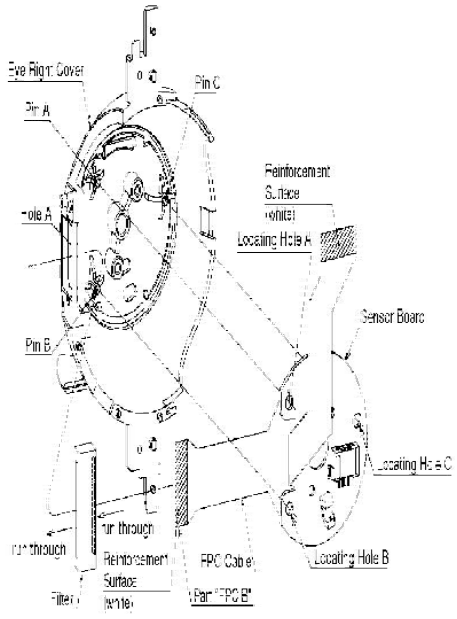



(2) Arrange the form of the folded part of the FPC Cable as shown below.



5. Attach the Sensor Board to the Eye Right Cover and fix it with the Screw (D).

(1) Put Part "FPC B" of the FPC Cable through the Filter and Hole B of the Eye Right Cover from inside.
Align the Locating Holes of the Lead Wire and Locating Holes A and B of the Sensor Board put each locating pin



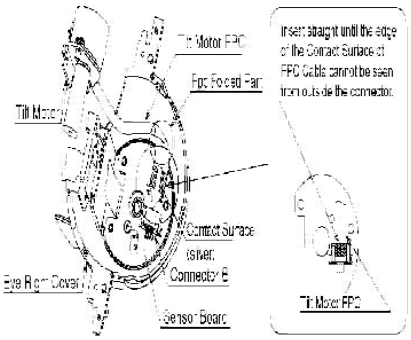

**Caution:**

**Make sure that the Locating Holes (2 places) of FPC Cable and Locating Holes A and B (2 places) of Sensor Board are overlapped and put into Pin A and B of the Eye Right.**

(2) Once the confirmations are determined, fix the Sensor Board with the Screws (C).

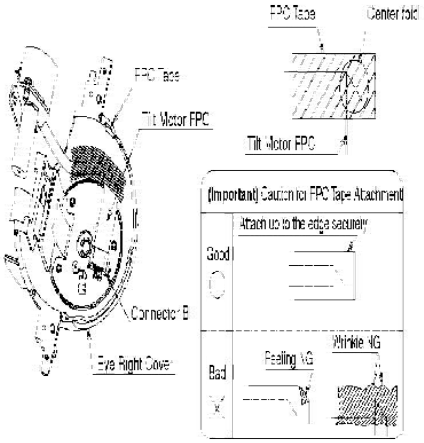
## 9.4. CAUTIONS FOR PAN MOTOR UNIT ATTACHMENT

1. Insert the Tilt Motor FPC of the Tilt Motor into Connector B of the Sensor Board.



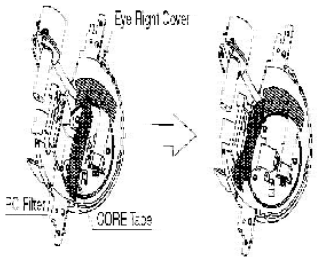

**Caution:**
Before inserting the FPC into the connector, check the folded part.

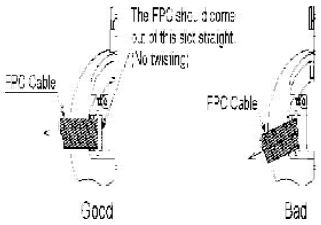
2. Attach the Tilt Motor FPC of the Tilt Motor using the FPC Tape on the inside of the Eye Right Cover.

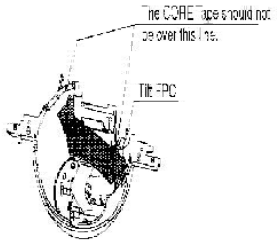



**Caution:**
At the attachment, the folding center of the Tilt Motor FPC should be to the right of the center of the FPC Tape.
Make sure that the Tilt Motor FPC is not removed from the connector.

3. Attach the FC Filter using the CORE Tape to the inside of the Eye Right Cover.



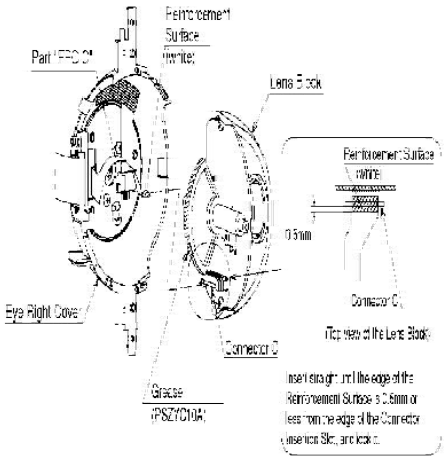




**Caution:**
When the CORE Tape is attached, it should be attached carefully so as not to be out of the line of the Eye Right Cover.

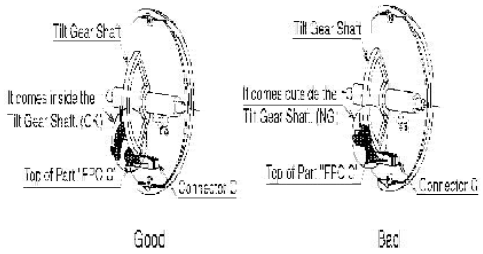
## 9.5. CAUTIONS FOR CAMERA BOARD ATTACHMENT

1. Attach the Lens Block to the Eye Right Cover.

(1) Form Part "FPC C" of the FPC Cable as shown below, insert it into Connector C of the Lens Block and lock it.




(2) Attach the top of Part "FPC C" between the Tilt Gear Shaft and the Lens Block as shown below so that it does not come outside the shaft.

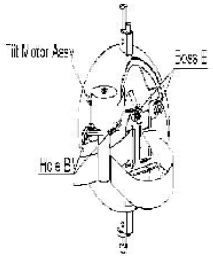



**Caution:**
Do not touch the lens during attachment of the Lens Block.

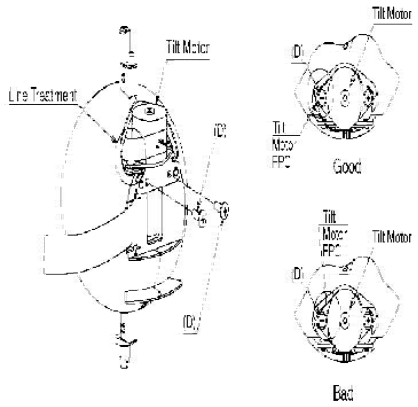
## 9.6. CAUTIONS FOR TILT MOTOR ATTACHMENT

**Attach the Tilt Motor and fix it with the Screws (D).**

(1) Turn the Tilt Motor 180 degrees to align the positions of Hole B and Boss B, and attach it.



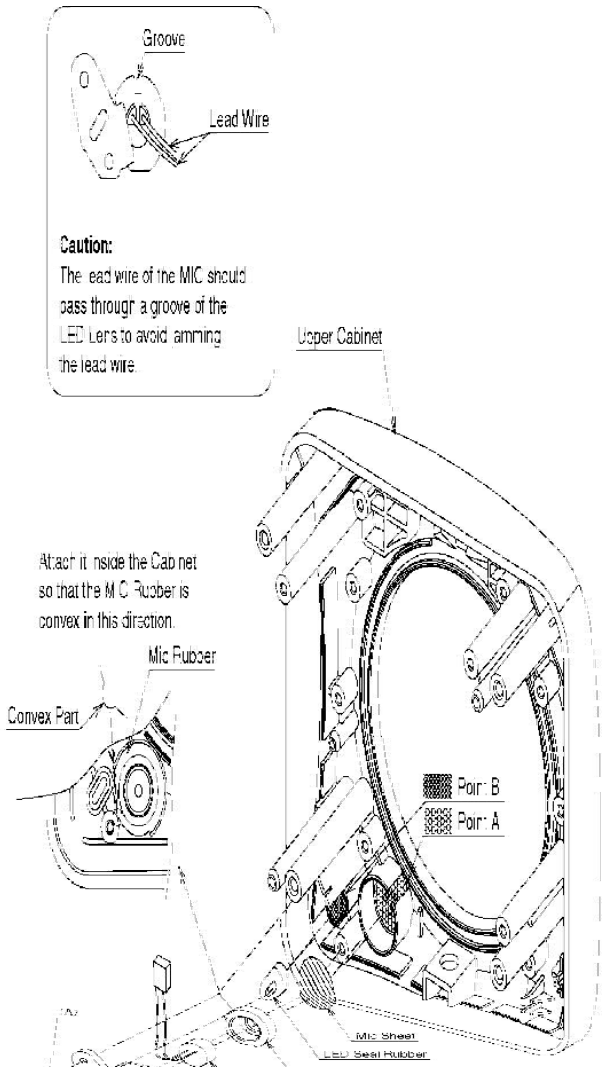

(2) Fix Tilt Motor with the Screws (D).




**Caution:**
The line treatment of the Tilt Motor FPC or Tilt Motor should not enter the space between the Tilt Motor and the Screws (D).

## 9.7. CAUTIONS FOR MIC ATTACHMENT

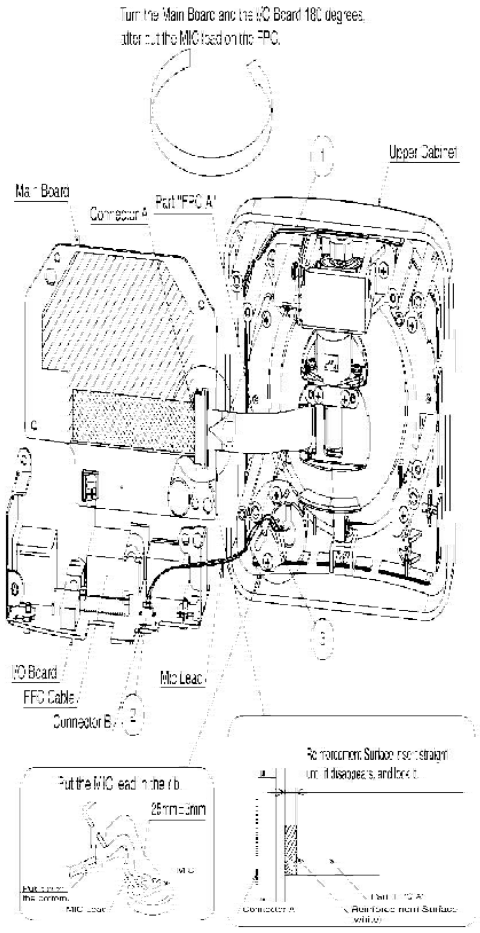
**Attach the MIC Sheet to Point A on the Upper Cabinet and attach the LED Seal Rubber to close the hole of Point B.**
**Then, insert the MIC Rubber, the MIC and the LED Lens and fix them with the Screws (A).**



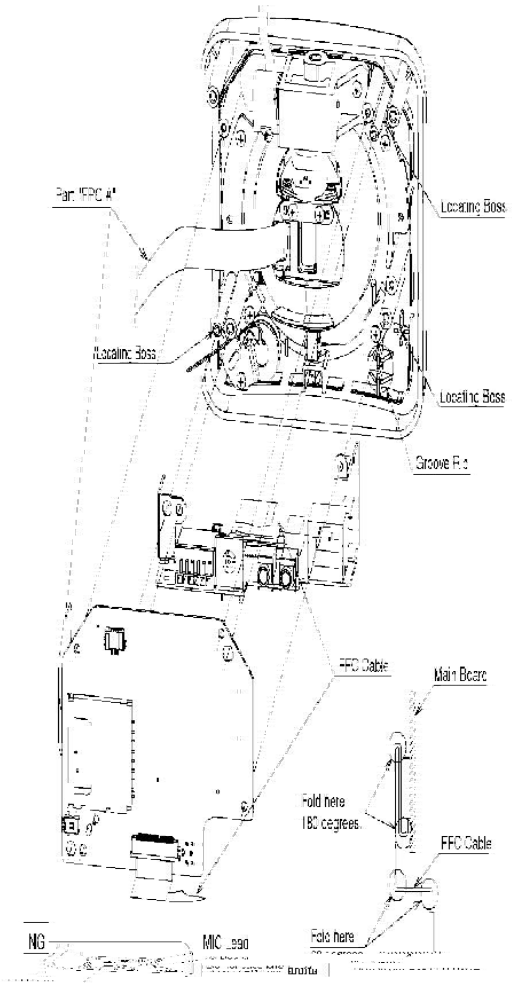

## 9.8. CAUTIONS FOR MAIN BOARD ATTACHMENT

**Attach the component that connects the Main Board and the I/O Board with the FFC Cable, to the Upper Cabinet and fix it with the Screw (A).**

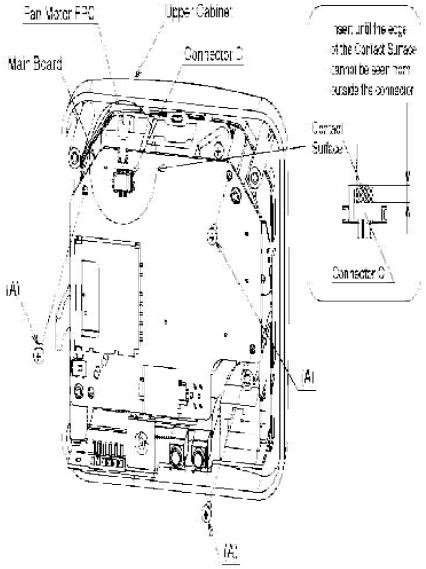
(1)① Insert Part "FPC A" to Connector A of the component that connects the Main Board and the I/O Board with the FPC Cable and lock it.
② Connect the MIC lead to Connector G of the Board.
③ Put the MIC lead in the rib and turn the Main Board and the I/O Board 180 degrees.



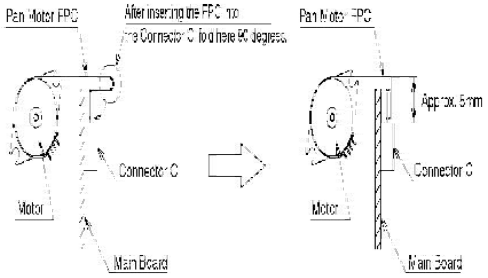
(2) Align the MC Board with the groove rib and locating bosses of the Upper Cabinet and the holes of the Main Board with its bosses.



(3) Fix the Main Board to the Upper Cabinet with the Screws (A)
(4) Hose the Pan Motor FPC to Connector C




Caution:
How to process the Pan Motor FPC




## 9.9. CAUTIONS FOR PLASTIC PATS ATTACHMENT

**Attach the Sheet to the Cabinet Cover mount the Cabinet Cover on the Upper Cabinet, and fix it with the Screws (B).**

(1) Attach the Sheet inside the Cabinet Cover.

Notes: 1) Attach it from the bottom side as shown below.

2) Only the ends of the Sheet have adhesive, press them securely at attachment.

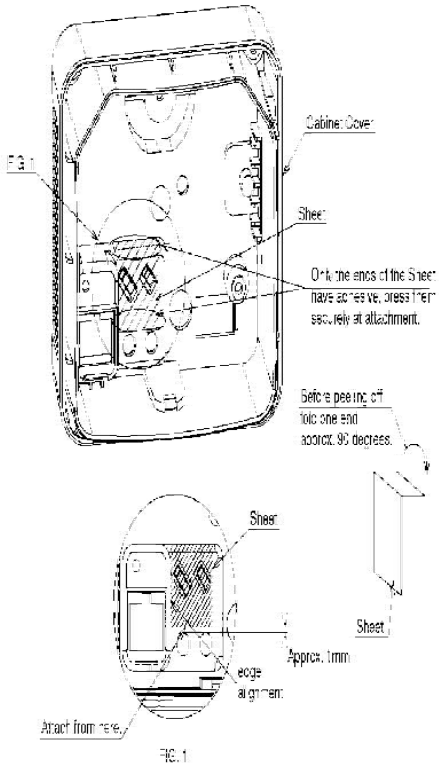
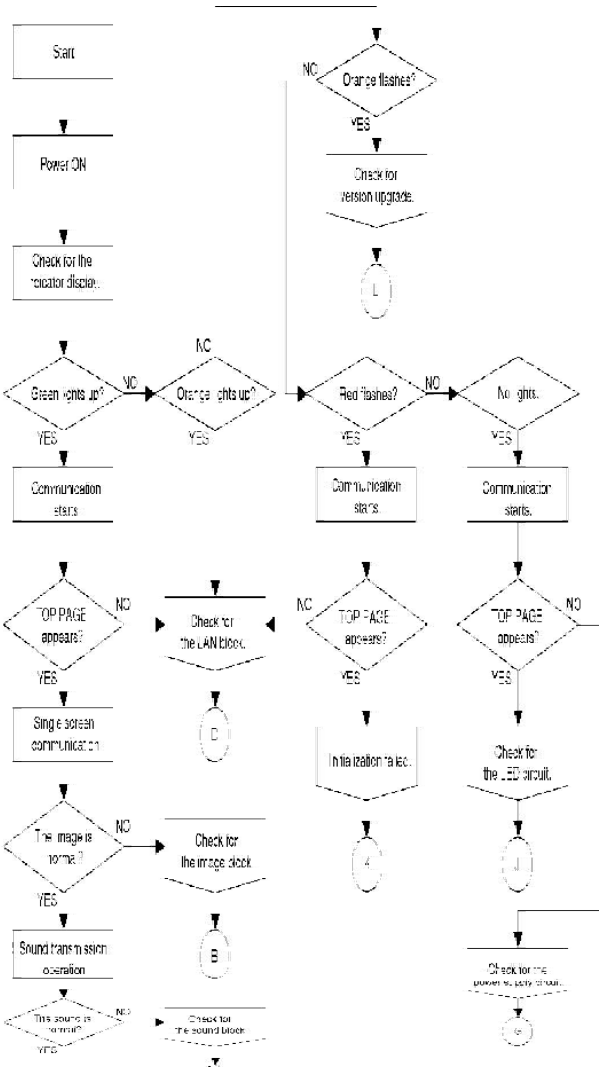


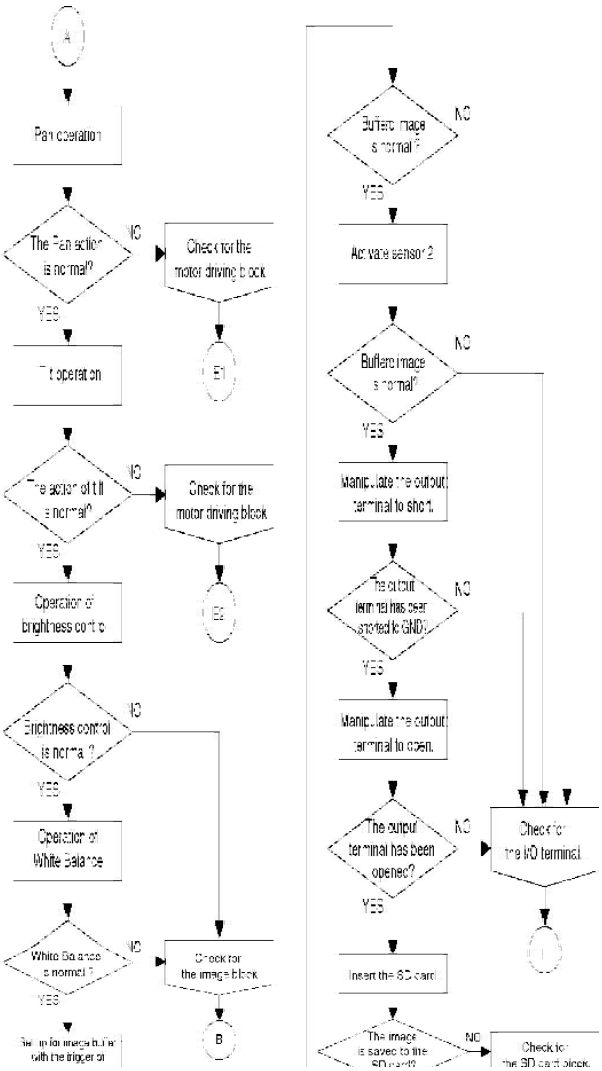

FIG. 1

# 10. TROUBLE SHOUTING

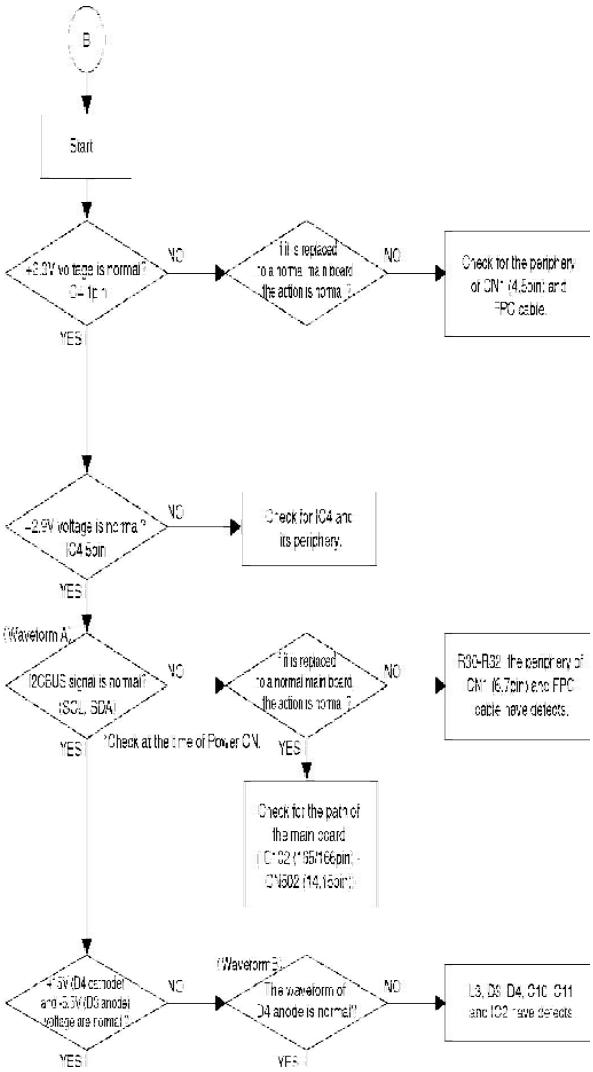
## 10.1. BASIC OPERATION

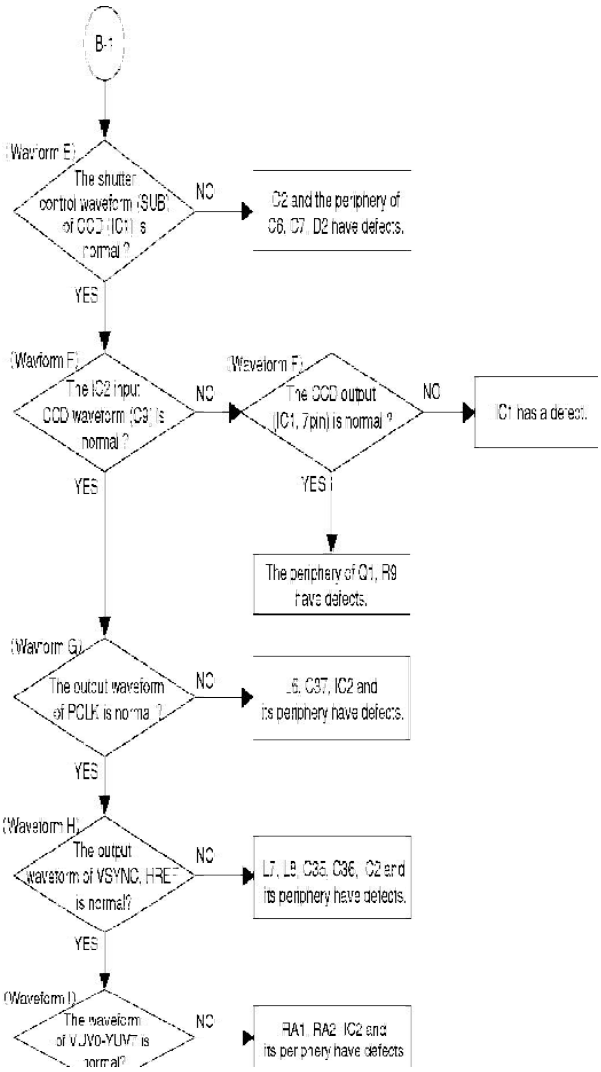



## 10.2. CHECK FOR OTHER FUNCTION

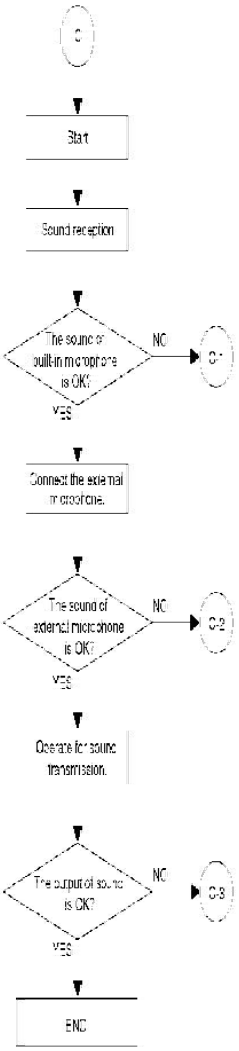



## 10.3. CHECK FOR SCREEN BLOCK

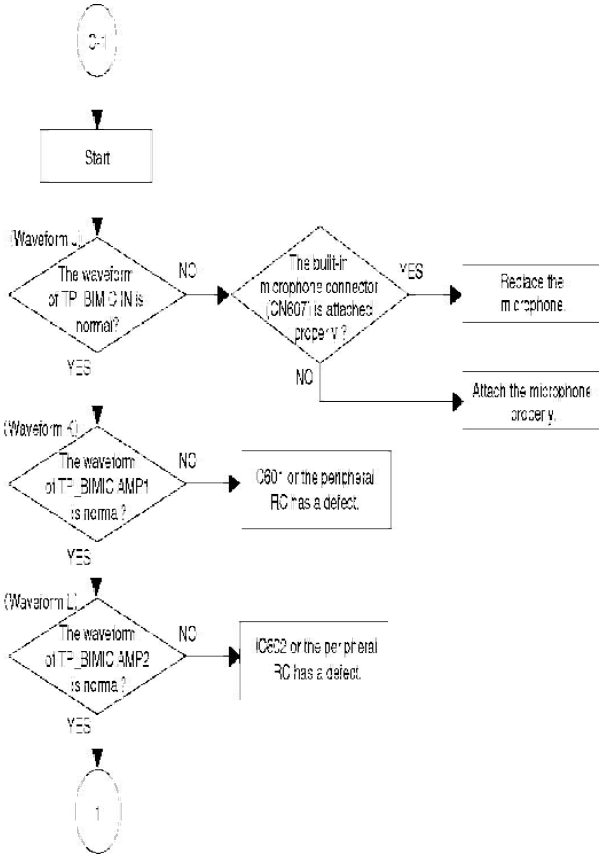

B
Start
NO
NO
Check for the peripher
or CN
FPC cable.
YES
NO
Check for IC4 and
its periphery.
YES
(Waveform A)
NO
NO
R30-R32 the peripheral of
CN
YES
YES
Check at the time of Power ON.
Check for the path of
the main board
(IC
CN602 (14,16pin))
(Waveform B)
NO
NO
L3, D3, D4, C10, C11
and IC2
YES




## 10.4. CHECK FOR SOUND BLOCK

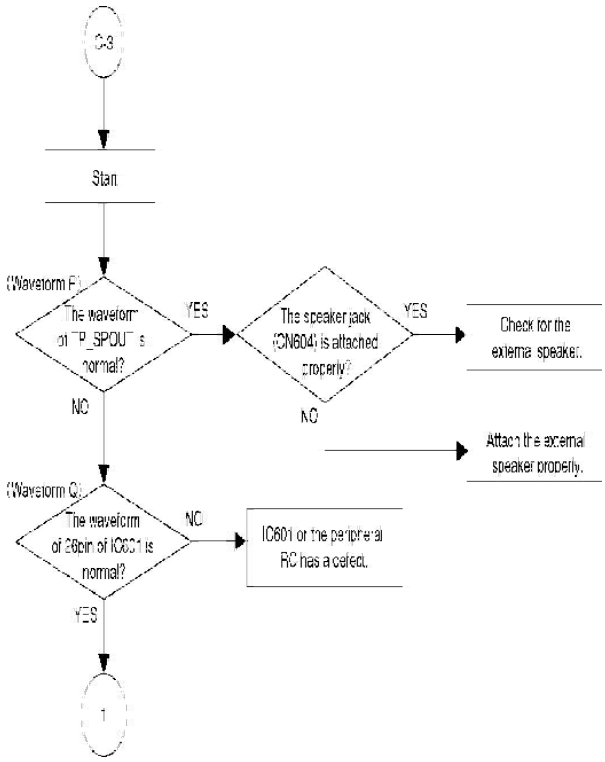



### 10.4.1. Built-in Microphone

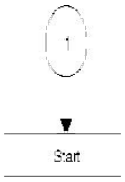



## 10.4.2. External Microphone

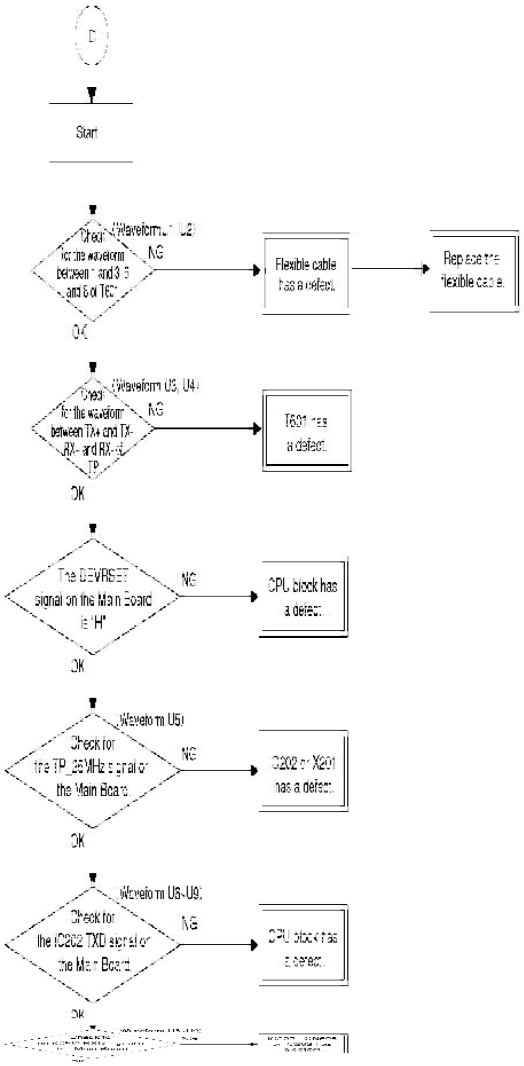

## 10.4.3. Speaker Output




## 10.4.4. Common Flow Of Built-in Microphone, External Microphone And Speaker Output

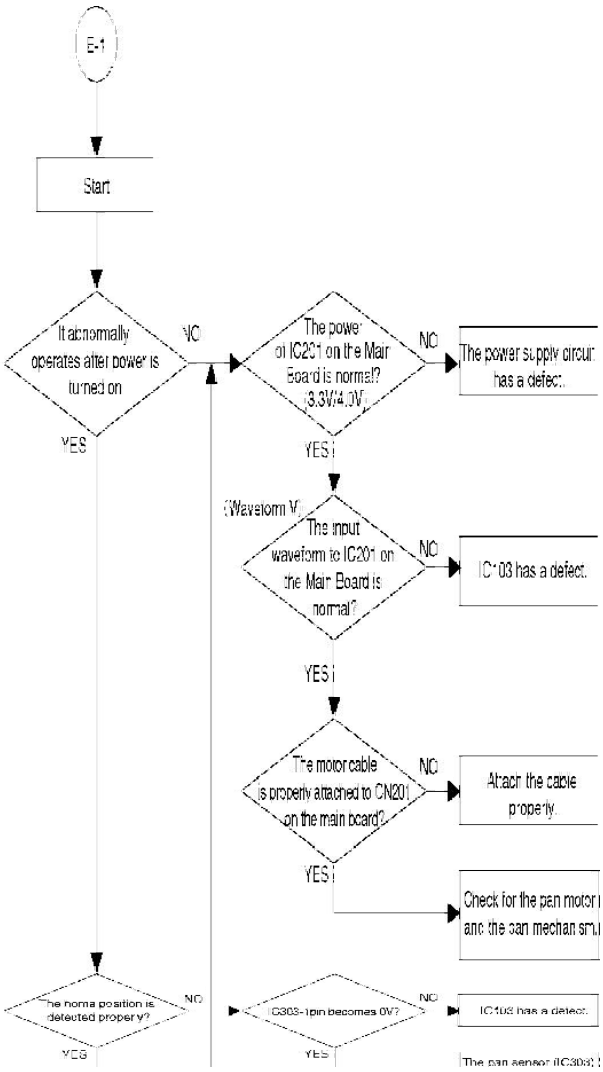



## 10.4.5. Check For LAN Block

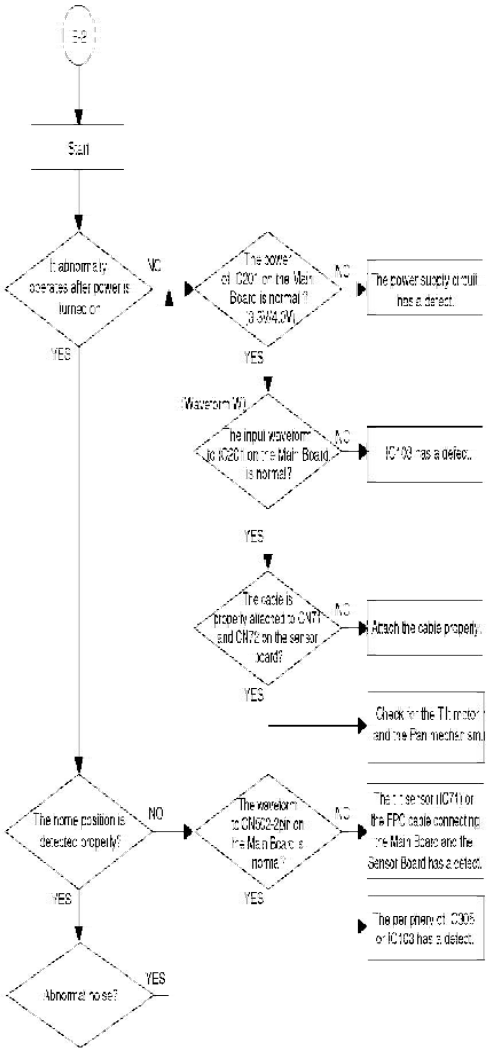



## 10.5. CHECK FOR MOTOR DRIVING BLOCK

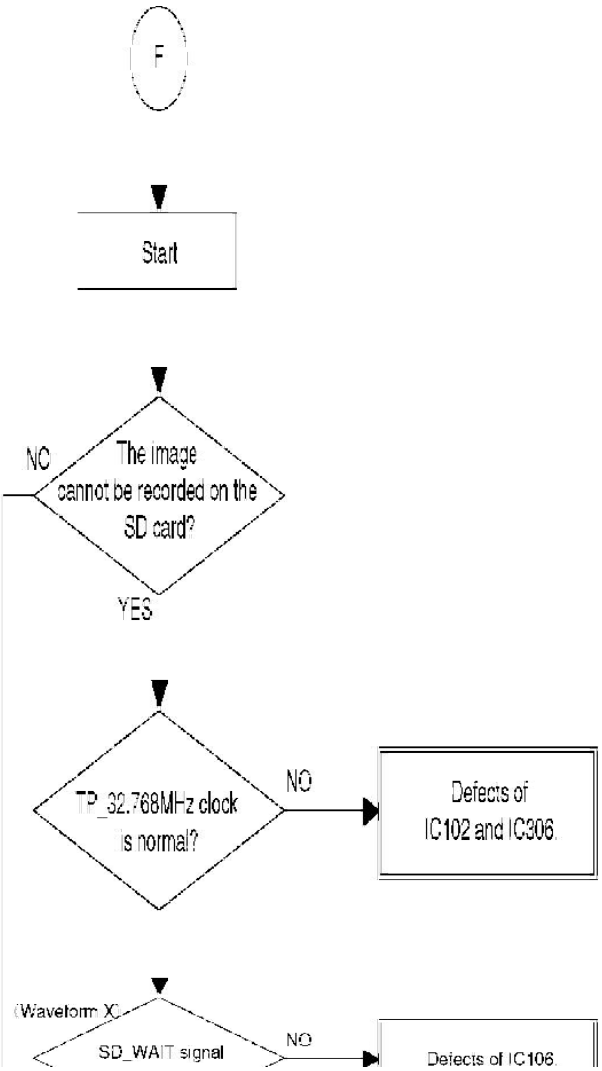
### 10.5.1. Check For The Action Of Pan

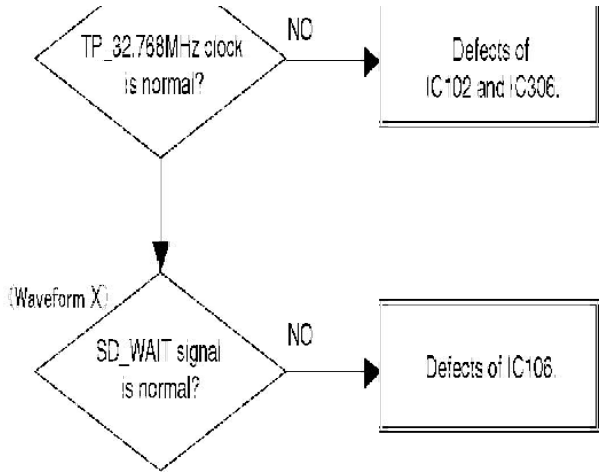



## 10.5.2. Check For The Action Of Tilt

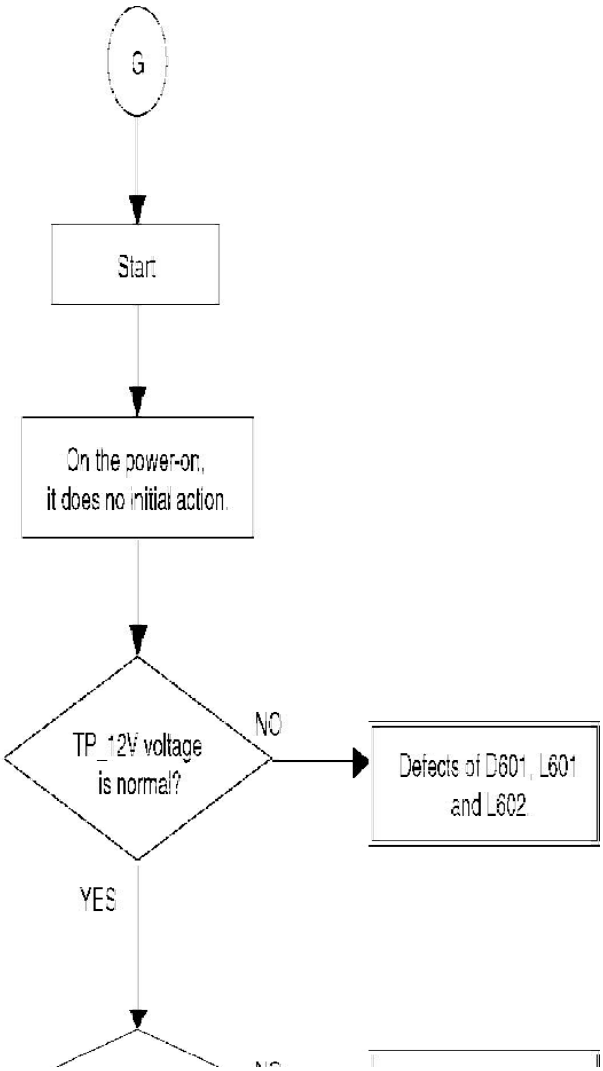


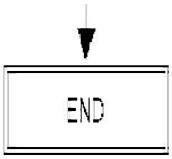

## 10.6. CHECK FOR SD CARD


F
Start
NG
The image cannot be recorded on the SD card?
YES
TP_32.768MHz clock is normal?
NO
Defects of IC102 and IC306.
(Waveform X)
SD_WAIT signal
NO
Defects of IC106.

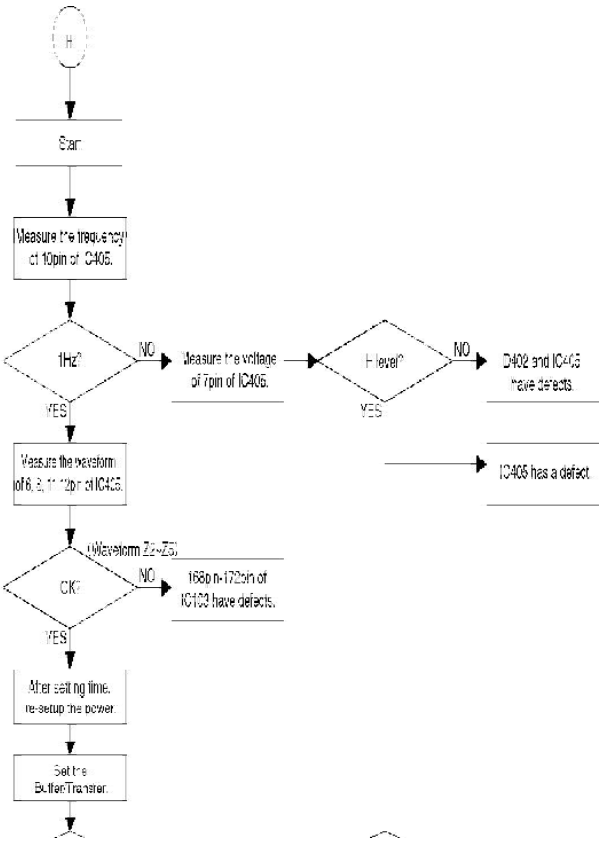



## 10.7. CHECK FOR POWER SUPPLY BLOCK

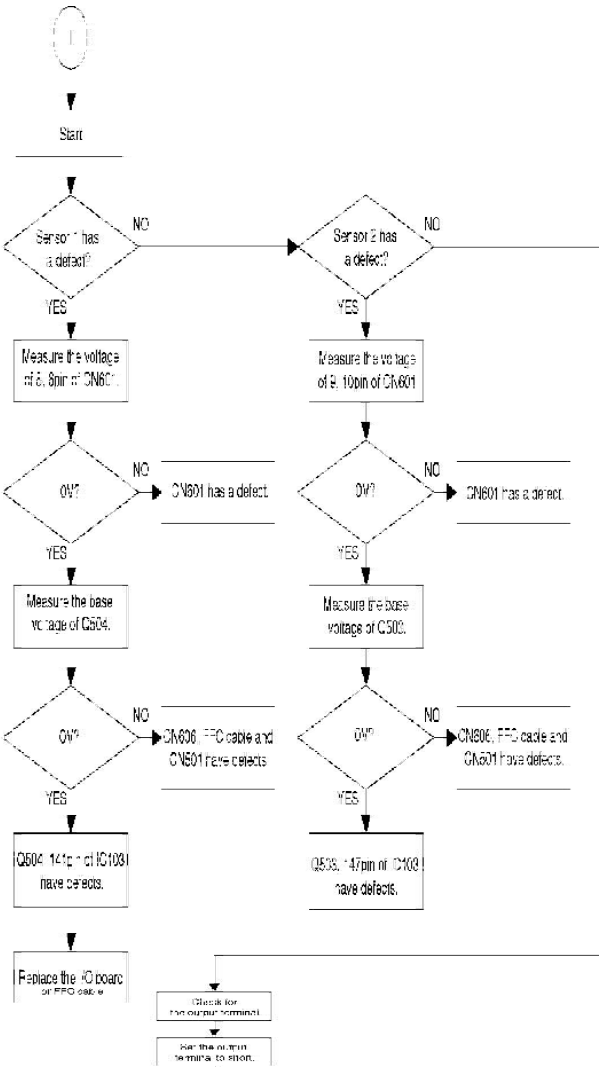

G
Start
On the power-on,
it does no initial action.
TP_12V voltage
is normal?
NO
Defects of D601, L601
and L602
YES



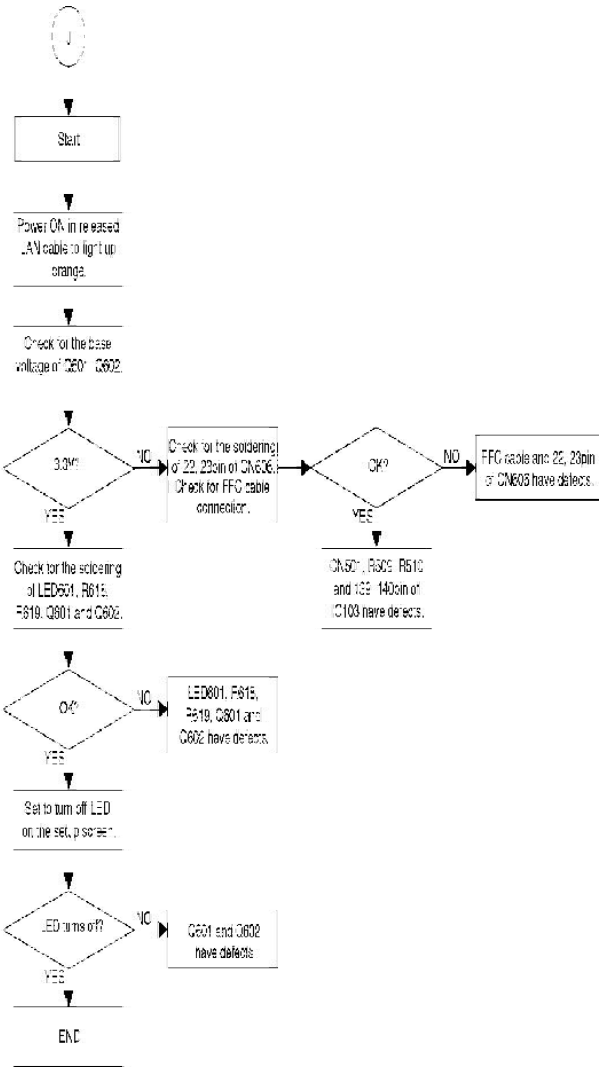

## 10.8. CHECK FOR RTC CIRCUIT




## 10.9. CHECK FOR I/O TERMINAL



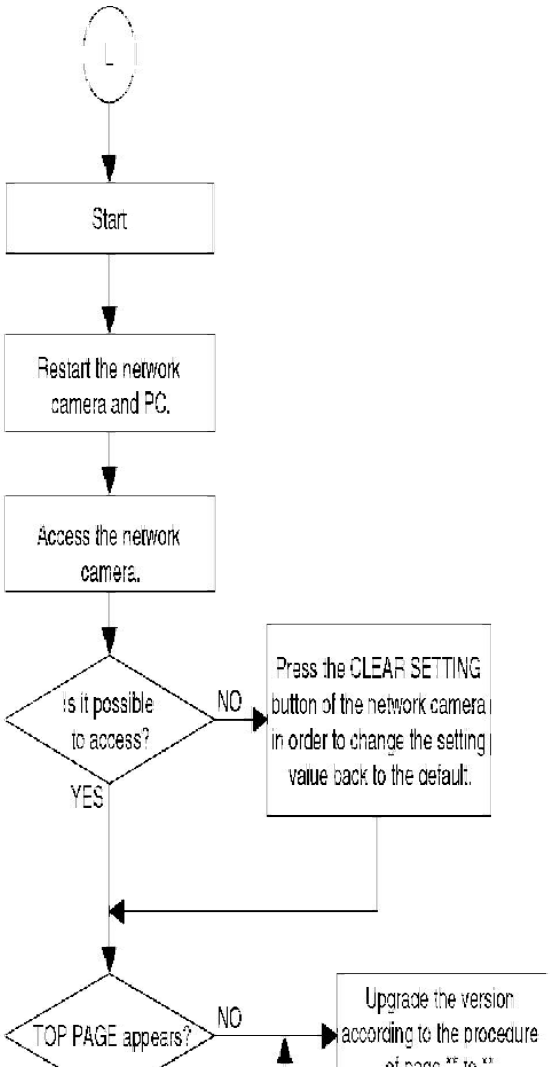

## 10.10. CHECK FOR LED CIRCUIT




## 10.11. CHECK FOR INITIALIZATION



## 10.12. CHECK FOR VERSION UPGRADE




# 11. THE WAY OF THE INITIALIZE

## 11.1. FACTORY DEFAULT RESET BUTTON

**The camera has a Factory Default Reset button on the rear.**

**Pressing the Factory Default Reset button resets the camera to factory default.**
**If you lose your user name and password, use this button to reset the camera.**

- **Press the Factory Default Reset button for 1 second when the camera is on.**
- **The indicator blinks orange, and turn off for 10 seconds.**
- **Do not turn off the camera until the indicator lights green.**

**Note:**

- **Internal clock will not be reset, but the time format will return to AM/PM mode. Set it again.**
- **All buffered images are deleted when resetting the camera to factory default.**
- **The reset operation takes about 1 minute.**

## 11.2. RESETTING THE CAMERA TO FACTORY DEFAULT

**This feature will be executed and all camera settings reset to factory default directly after the Execute button is clicked.**

**1. Click [Reset to Factory Default] on the Maintenance page.**
**2. Click [Execute].**

- **The indicator blinks orange, and turn off for 10 seconds.**
- **All camera settings (user name, password, IP address, subnet mask etc.) are reset to factory default.**
- **If the camera is reset to factory default, the network connection modechanges to [Automatic Setup]. Reconfigure the camera seeing the Getting Started.**

**Note:**

- **Internal clock will not be reset, but the time format will return to AM/PM mode. Set it again.**
- **Please refer to Operating Instructions for default values.**
- **Pressing FACTORY DEFAULT RESET button resets the camera to the factory default.**
- **All buffered images are deleted when resetting the camera to factory default.**
- **The reset operation takes about 1 minute.**

- Do not turn off the camera during the reset operation.

# 12. BLOCK DIAGRAM

# 13. CIRCUIT DESCRIPTION

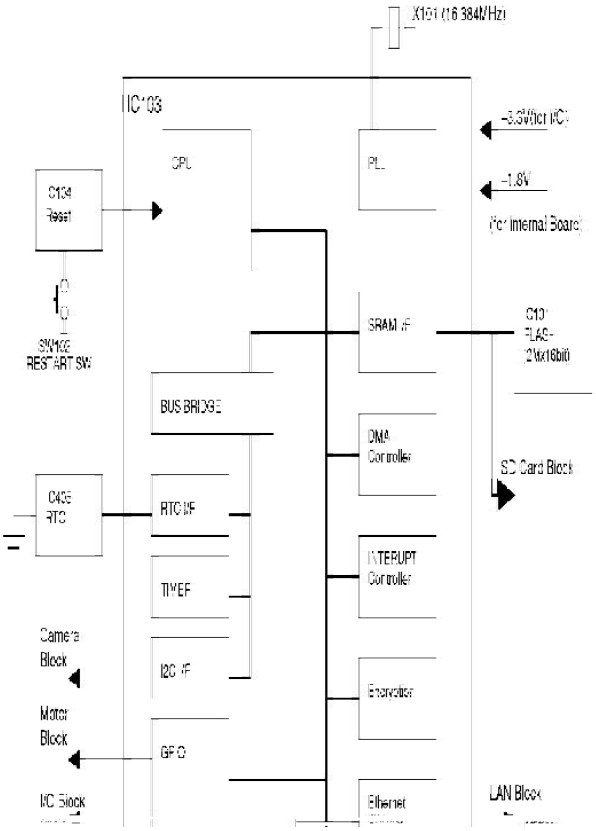
## 13.1. CPU PERIPHERAL BLOCK

- The IC103 is a system LSI for a network camera containing the CPU
- The power supply voltages are +3.3V (I/O) and +1.8V.
- The CPU is a 32-bit RISC CPU and performs mainly hardware control, TCP/IP protocol processing and applications such as http and FTP.
- The clock setting is 65.536MHz, which is the four times of 16.384MHz oscillation in the X101 by PLL.
- There are two types of external bus: the General-purpose bus through SRAM I/F and the bus for SDRAM only.
- The General bus is connected to a Flash Memory for program storage.
- The capacity of the Flash Memory (IC101) is 32Mbit (2Mx16bit); the program, the setting information for the network camera and the MAC address are stored.
- The SDRAM (IC105) is 64Mbit (4Mx16bit) and used for the CPU processing work, the communication data storage and the sound and image data storage.
- The RESET IC (IC104) monitors the power supply voltage, detects the rising edge of +3.3V and generates the Hardware Reset Signal.
- The RESTART SW (SW102) is connected to the RESET IC for manual reset and the hardware is reset by pressing the SW.
- The IC405 is a RTC (Real Time Clock) and is used for the time setting of the image transfer. It is backed up at power-off by a lithium battery (BAT401). The I/F with the CPU has a dedicated controller. (5-line I/F)
- The Encryption block inside the IC103 is an Ipsec communication encryption engine and is used at the software protocol processing.

**Signal Flow**

1. When a request from the PC is received through LAN, the CGI command is analyzed at the CPU and the requested image/sound data are generated.
2. The JPEG image and sound data accumulated on the SDRAM are formed in IP packet by the protocol processing.

3. If the Ipsec is not encrypted, it is sent without change. If it is encrypted, this is carried out in the Encryption Block and a header is added to send to the Ethernet MAC part.




## 13.2. CAMERA BLOCK

**Basic Function**

**<Image System>**

**The subject image from a lens is photoelectric-converted by CCD (IC1). The CCD output analog image signal is input to the DSP (IC2). After the A/D conversion after analog preprocessing and the specified Signal Processing, it is output as a YUV 8bit signal.**

**<Power Supply System>**

**In the power supply system, +3.3V is input from the Main Board. +2.9V is generated by a regulator and the Power Supply for CCD of +15 and -5.5V is generated by the DC-DC converter contained in the DSP.**

## 1. CCD (IC1)

**Operating Voltage: +15V, -5.5V**
**Effective Number of Pixels: 659 x 494**
**Image Size: 1/4 type**
**Color Filter: Original Colors RGB**
**Package: 14pin Plastic DIP**
**The CCD is driven by the horizontal driving signal (H1, H2, RG) and the vertical driving signal (V1, V2A, V2B, V3) output from the DSP (IC2). The subject image focused by a lens is converted to electrical signals, read out by the driving signal and input to the DSP through IC1(pin 7) to Q1.**

## 2. DSP (IC2)

**Characteristics: AFE, V-driver, 3-chip SEP (System Embedded Package) of the Signal Processing DSP**
**Power Supply: +3.3V, +2.9V**
**Function: CCD Drive, CDS, AGC, A/D, Luminance Signal Processing (gamma correction, outline correction etc.)**
**Color Signal Processing (White Balance, Matrix etc.), Automatic flaw correction AE/AWB/AGC control by the Signal Processing DSP microcomputer, Fluorescent lamp flicker-free**
**Package: 312pin Ceramic BGA**
**Clock Frequency: 24.5454MHz**

**<AFE Chip>**
**The specified sampling is performed in the CDS circuit inside the AFE chip and the noise of the CCD output signal is removed. After it is adjusted to the specified level according to the instruction from the Signal Processing DSP in the GCA circuit, it is converted to 10-bit digital signal by the A/D converter inside the AFE chip and input to the Signal Processing DSP.**
**Power (+3.3V) is supplied through L4 and L5 after the ON/OFF control by the Signal Processing DSP.**
**<V-driver Chip>**
**Generates the CCD power supply of +15V and -5.5V from the input of +3.3V by the external L3, D3, D4, C10 and C11.**
**Generates 3-values V-drive signal for CCD driving by a timing signal from the Signal Processing DSP.**
**<Signal Processing DSP Chip>**
**Processes the AFE output signal, and outputs the Analog Y signal and C signal. Outputs the CCD driving signal.**
**The built-in microcomputer performs the AE (Auto Exposure) and AWB (Auto White Balance) processing, and the Read/Write for each control and setting. The Read/Write for each setting to the IC is performed by the Main CPU (IC102) on the Main Board on I2CBUS (SDL, SDA).**

**=Image Signal Processing=**

**The 10bit CCD output signal from the AFE chip is processed as follows:**
**1. The outline in the horizontal and vertical directions is corrected**
**2. The characteristics of gray-scale are corrected by gamma correction.**
**3. The white balance is corrected.**
**4. The RGB signal is converted to the luminance signal (Y signal) and the color difference signal (R-Y (V), B-Y (U) signal).**
**5. The color saturation and phase are adjusted by color difference matrix.**
**6. It is output as YUV 8bit signal.**

**=CCD Driving Signal and Timing Signal Generation=**
**CCD Driving Signal [For horizontal (H1, H2, RG), vertical (V1, V2A, V2B, V3)], Timing Signal [HREF Signal, Vsync Signal, and AFE (DS1, DS2, ADCLK, CPOB)] etc. are output. The timing of these signals is set by a serial signal from the CAMERA CPU.**

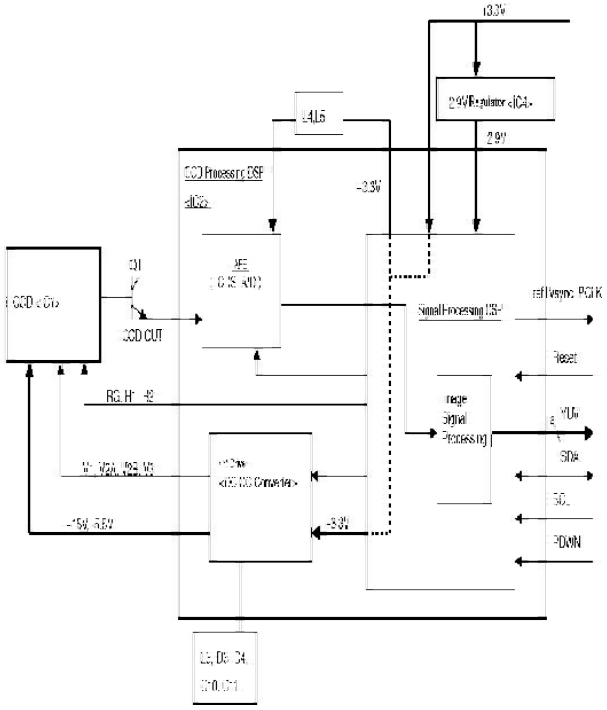
**=AE Control Signal Generation=**
**Based on the luminance signal level detected by the image signal processing area, the AGC gain control and the exposure time control to CCD of the AFE chip (by CCD shutter speed control signal (SUBA Signal (IC2(pin V6) --> C7 --> C6 --> IC1(pin 10))) are performed.**

## 3. Clock

**Generated on 24.5454MHz crystal oscillator (X1) on the board.**

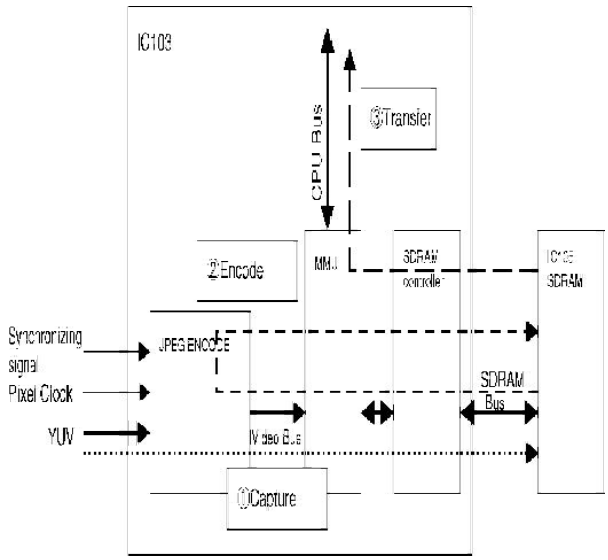
## 4. Regulator (IC4)

**Input +3.3V, Output +2.9V**
**Package: 5pinSOP**



## 13.3. JPEG BLOCK

- The IC103 is a system LSI for a network camera containing the CPU.
- The JPEC Encode Circuit, the Memory Management Unit(MMU) and the SDRAM Controller are built into this LSI.
- The image data(YUV) inputted from a Camera Block is captured to the SDRAM through the JPEG Encode Block, the MMC and the SDRAM Controller. (1)
- The captured YUV data are inputted to the JPEG Encode Block again and the JPEG processing is performed here. The compressed encode data are stored to the SDRAM. (2)
- A header is added to the encoded JPEG data by a direction of the CPU and it is transferred to a network after a protocol processing. (3)




## 13.4. SOUND BLOCK

**External Microphone Jack (CN603)**

**Used with the external microphone.**

**Speaker Jack (CN604)**

**Used when connecting a speaker with a built-in amplifier, when the sound is output from a camera.**

**Microphone Detection (Q603)**

**When the external microphone plug is not inserted, pins 3 and 2 of the Microphone Jack (CN603) are short-circuited and a base current is supplied to Q603 through R603, R632 and R629 so that the Q603 goes ON and a collector (MIC_S signal) goes LOW. Alternatively, when the microphone plug is inserted, pins 3 and 2 of the CN603 become open so that the Q603 goes OFF and the MIC_S signal goes HIGH. From this signal, the CPU detects the microphone status.**
**The CPU turns the microphone SW on and off in the PCM Codec (IC601) for the external or the built-in microphone, as appropriate.**

**ALC Amplifier (IC602: For the built-in microphone, IC603: For the external microphone)**

**Power Supply: 3.3V**
**Amplifier for Auto Level Control**

**PCM Codec (IC601)**

**Power Supply Voltage: 3.3V**
**Clock Frequency: Contains a built-in PLL function and generates a clock from the BCLK (256 KHz). Contains an amplifier, LPF, gain adjustment, AD/DA converter, host I/F, PCM serial I/F and speaker output function.**

**Flow of Sound Signal**

**[Microphone sound]**

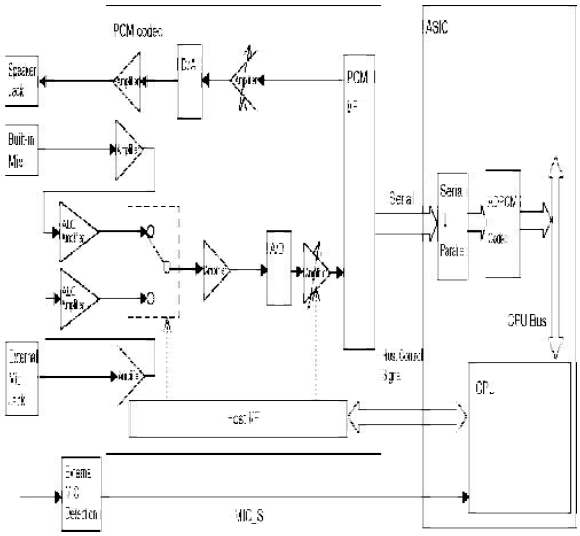
1. **The sound data input from pin 1 of the built-in microphone connector (CN607) is amplified by the amplifier in the PCM Codec (IC601) and the ALC (IC603), then input as the built-in microphone to the PCM Codec (IC601) again.**
   **When the level of the input sound signal is more than the specified value, the gain is changed and the output signal level is kept constant at the ALC (IC603). Sound distortion is controlled when the input is excessive.**
2. **When the external microphone is attached to the microphone jack (CN603), the sound signal input from pin 2 of the CN603 is amplified by the amplifier in the PCM Codec (IC601) and the ALC (IC602), then input as the external (microphone) to the PCM Codec (IC601) again**
   **The ALC (IC602) works in the same way as the IC603.**
3. **In the PCM Codec (IC601), after the sound signal is switched between the built-in microphone and the external microphone by a register setting from the host, amplification, AD conversion and gain adjustment are performed.**
   **The sampling frequency of the A/D conversion is 8kHz and it is converted to the PCM in the format of 8bit and law. Then, 64kbps data are output to the ASIC (101) through the Serial I/F.**
   **The data transfer of the Serial I/F is BCLK (256 kHz).**
4. **The data compression of 32kbps is performed in the ADPCM Block of the ASIC (101) and the data transferred as sound data.**

**[Speaker Sound]**

1. **The ADPCM sound data are sent from the PC and, after data decompression in the ADPCM block of the ASIC (101), the data are transferred as the sound data of 64kbps to the PCM Codec (IC601)**

through the Serial I/F.

2. After the μ law to linear conversion, amplification and DA conversion, they are output to pin 2 of the speaker jack (CN604) as sound output signal in the PCM Codec (IC601).




## 13.5. LAN BLOCK

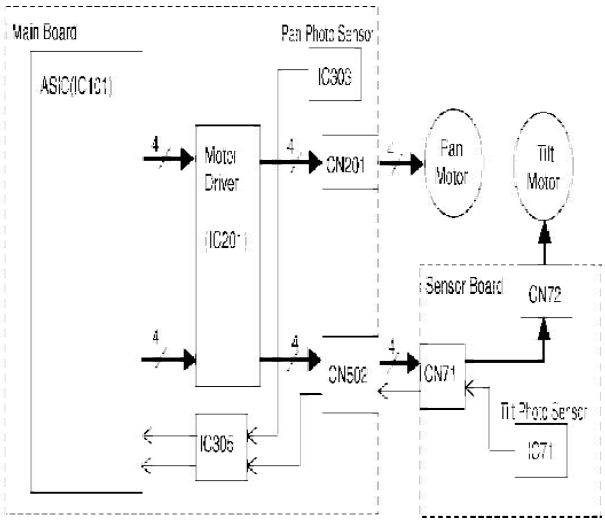
**Composed of the IC103 (CPU), the IC202 (ETHER-PHY), the T601 (Transformer) and the CN605 (RJ45). The T605 (Transformer) obtains isolation between the Set and the Ethernet.**
**The IC103 (CPU) and the IC202 (ETHER-PHY) are connected by a signal called MIIBus and it makes Ether net data sending and receiving possible.**

**Sending**
**The electrical signal sent from the IC103 is converted to Ethernet data at the IC202 and sent from the CN605 through the T601.**
**Receiving**
**The Ethernet data received from the CN605 is converted to electrical data at the IC202 and received to the IC103.**

## 13.6. MOTOR DRIVING BLOCK

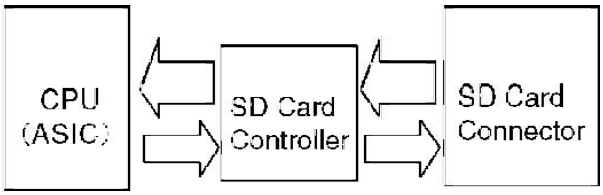
**The pan tilt is performed, as the ASIC (IC101) mounted on the Main Board controls the Motor Driver (IC201). The home position of the pan tilt operation is detected by the Pan Photo Sensor (IC303 on the**

**Main Board) and the Tilt Photo Sensor (IC71 on the Sensor Board).**

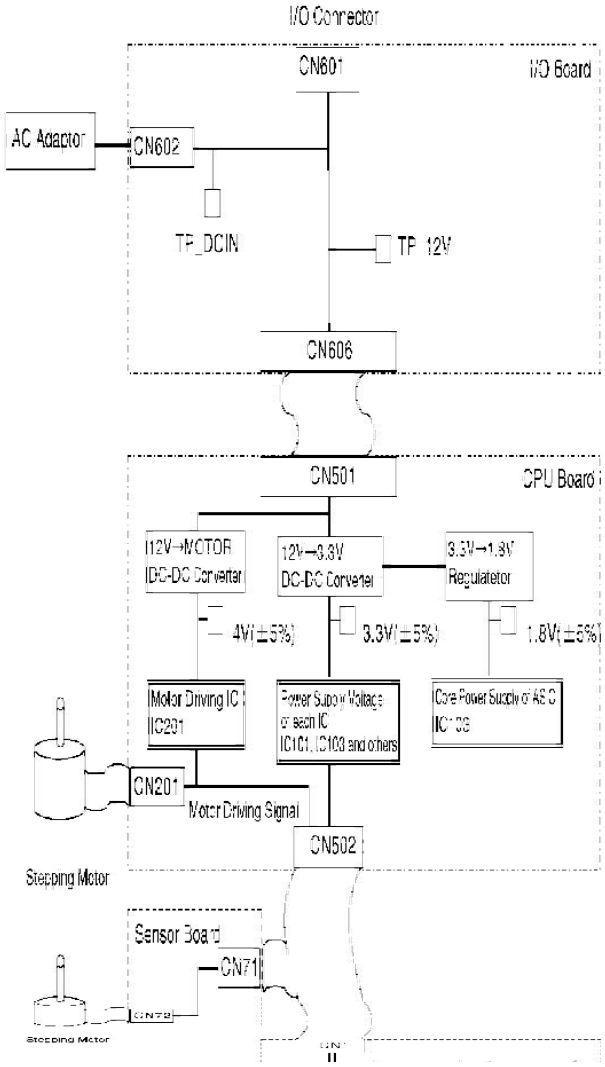



## 13.7. SD CARD BLOCK

**The data written on the SD Card are read out by the SD Card Controller and divided into IP Packets in the ASIC to be sent.**
**The JPEG-compressed image data from the ASIC are written on the SD Card by the SD Card Controller.**




## 13.8. POWER SUPPLY BLOCK




## 13.9. OTHERS

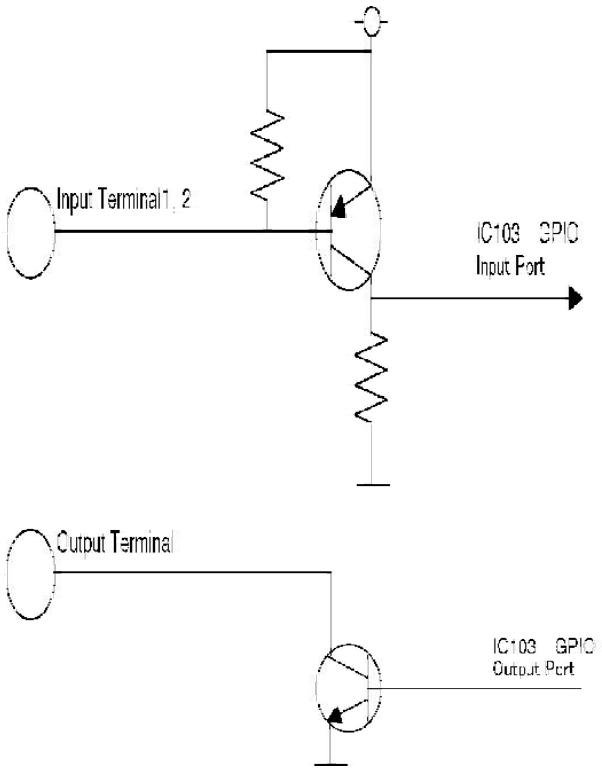
### 13.9.1. I/O Terminal

**- The Input terminal has two systems; both of them are connected to the Input Port of the IC103 GPIO.**

**- Due to Internal Pull-up Resistance, the PNP Transistor (Q504, Q503) on the following level is usually in the OFF state and the Input Port connected to the collector is at L level.**

**- If the terminal is short-circuited with the GND or the signal of L level is input, the PNP Transistor goes ON and the Input Port goes to H level.**

- The CPU checks the state of this port regularly to detect a change in this signal.
- The Output terminal is controlled by the Output Port of the IC103. When the Port output is L, the transistor (Q501) on the following level is OFF and, when the output is H, the transistor is ON. This transistor has open collector output and it controls external equipment via external pull-up.



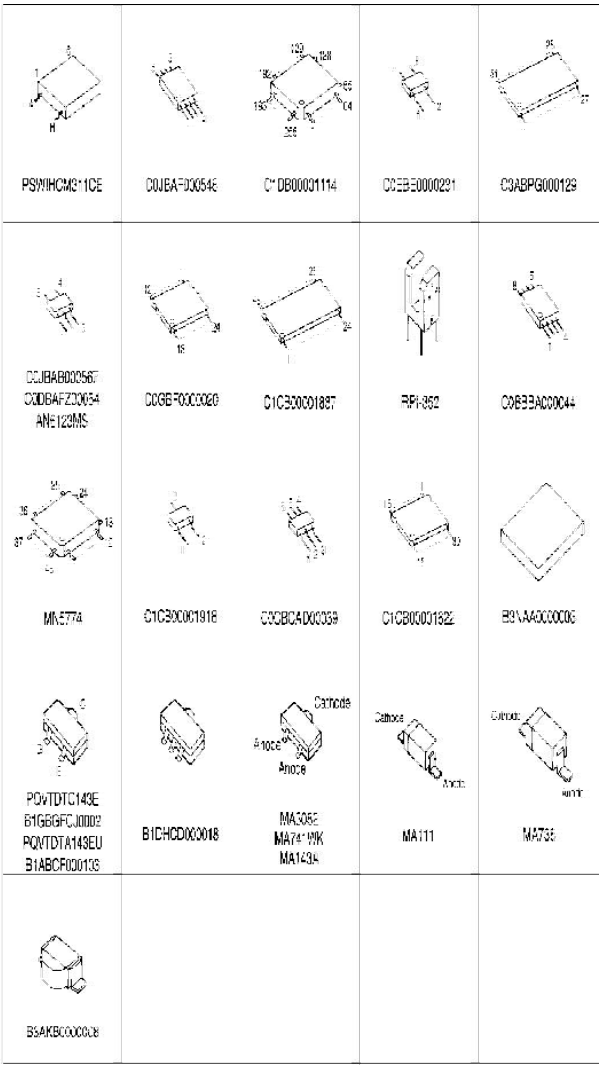

### 13.9.2. Factory Default Reset SW

- The Factory Default Reset SW (SW101) is connected to the Input Port of the GPIO. It is usually at H level and goes to L level, when the SW is pressed.
- The CPU monitors this Input Port regularly and, if it detects that this SW is pressed longer than a specified period, the setting values other than the RTC are returned to factory settings.

### 13.9.3. LED

- The LED (LED601) has two-color LEDs (red and green). When the transistor (Q601, Q602) connected to each LED is turned ON/OFF via the Output Port of the IC103, it controls the ON/OFF of the LED.

# 14. TERMINAL GUIDE OF ICS, TRANSISTORS AND DIODES




# 15. HOW TO REPLACE A FLAT PACKAGE IC

## 15.1. PREPARATION

**- PbF (: Pb free) Solder**

**- Soldering Iron**

**Tip Temperature of 700°F ± 20°F (370°C ± 10°C)**

**Note: We recommend a 30 to 40 Watt soldering iron. An expert may be able to use a 60 to 80 Watt iron where someone with less experience could overheat and damage the PCB foil.**

**- Flux**

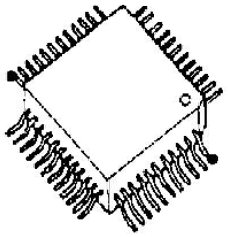
**Recommended Flux: Specific Gravity 0.82.**

**Type RMA (lower residue, non-cleaning type)**

**Note: See ABOUT LEAD FREE SOLDER (PbF: Pb free) ().**

## 15.2. PROCEDURE

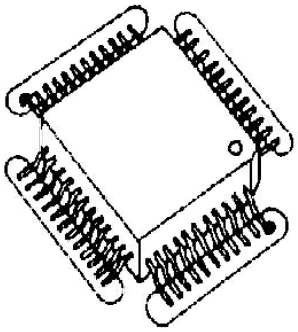
1. **Tack the flat pack IC to the PCB by temporarily soldering two diagonally opposite pins in the correct positions on the PCB.**



Temporary soldering point.

**Be certain each pin is located over the correct pad on the PCB.**

2. **Apply flux to all of the pins on the IC.**

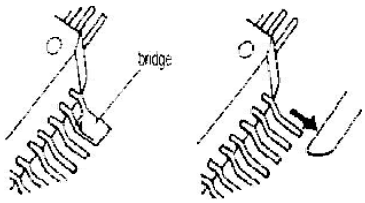


Flux

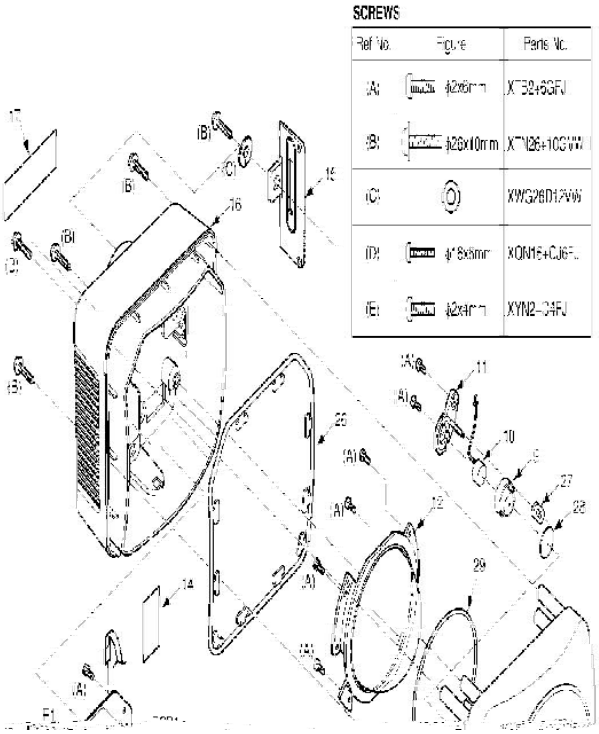
3. **Being careful to not unsolder the tack points, slide the soldering iron along the tips of the pins while feeding enough solder to the tip so that it flows under the pins as they are heated.**

## 15.3. REMOVING SOLDER FROM BETWEEN PINS

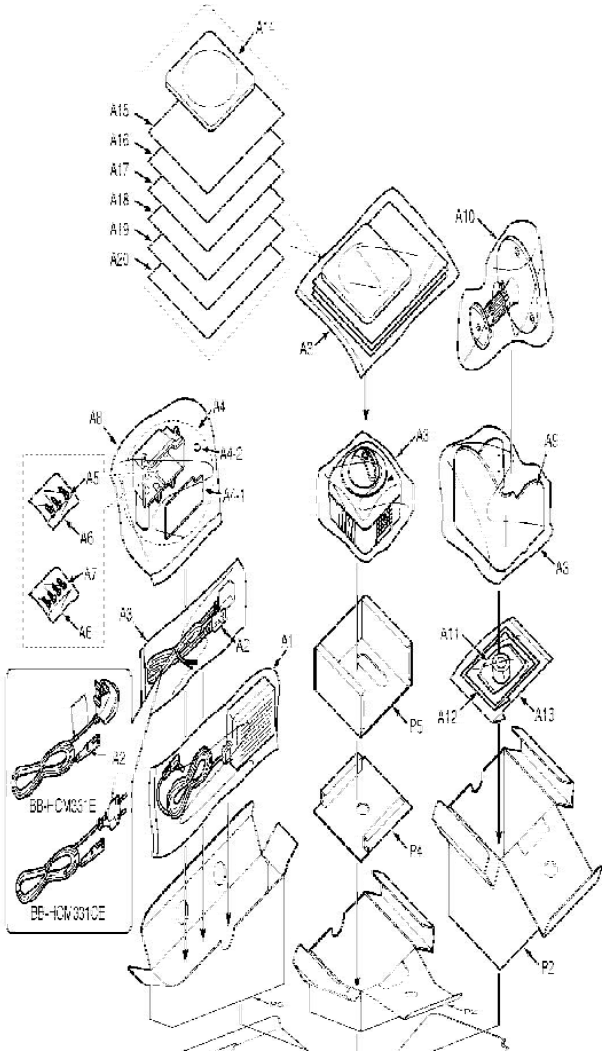
1. **Add a small amount of solder to the bridged pins.**
2. **With a hot iron, use a sweeping motion along the flat part of the pin to draw the solder from between the adjacent pads.**




# 16. CABINET AND ELECTRICAL PARTS LOCATION




# 17. ACCESSORIES AND PACKING MATERIALS




# 18. REPLACEMENT PARTS LIST

**Note:**

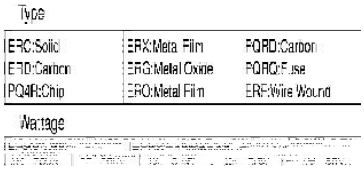
**1. RTL (Retention Time Limited)**

**The marking (RTL) indicates that the Retention Time is limited for this item.**

**After the discontinuation of this assembly in production, the item will**

**continue to be available for a specific period of time. The retention period of availability depends on the type of assembly and the laws governing parts and product retention. At the end of this period, the assembly will no longer be available.**

2. **Important safety notice**
   **Components identified by the ⚠ mark indicates special characteristics important for safety. When replacing any of these components, only use specified manufacture's parts.**
3. **The S mark means the part is one of some identical parts. For that reason, it may be different from the installed part.**
4. **ISO code (Example: ABS-94HB) of the remarks column shows quality of the material and a flame resisting grade about plastics.**
5. **RESISTORS & CAPACITORS**
   **Unless otherwise specified;**
   **All resistors are in ohms ( Ω ), k=1000 , M=1000k**
   **All capacitors are in MICRO FARADS ( F), p= ( F)**
   ***Type & Wattage of Resistor**




## 18.1. CABINET AND ELECTRICAL PARTS

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| 1 | PSJE1043Z | LEAD WIRE,FFC | |
| 2 | PSWQHCM311A | PAN MOTOR UNIT | |
| 3 | PSWQHCM311N | TILT MOTOR UNIT | |
| 4 | PSKV1040Y2 | EYE CENTER COVER | ABS+PC-V0 |
| 5 | PSLP1315Z | LENS BLOCK | ABS+PC-V0 |
| 6 | PSKE1073Y2 | EYE RIGHT COVER | ABS+PC-V0 |
| 7 | PSKE1072Y2 | EYE LEFT COVER | ABS+PC-V0 |
| 8 | PSKM1116Y1 | CABINET BODY | ABS+PC-V0 |
| 9 | PSMG1007Z | RUBBER PARTS,MIC | |
| 10 | PSJM1007Z | MICROPHONE | |
| 11 | PSHR1322Y | OPTIC CONDUCTIVE PARTS,LED LENS | PC-HB |
| 12 | PSKV1041Z | COVER,DOME | PC-HB |
| 13 | PSHR1318Z | PAN GEAR | POM-HB |
| 14 | PSHX1234Z | PLASTIC PARTS,SHEET | |
| 15 | PSHG1250Z | RUBBER PARTS,SD | |
| 16 | PSKF1082W1 | CABINET COVER | ABS+PC-V0 |
| 17 | PSGT2651Z | NAME PLATE (FOR BB-HCM331CE) | |
| 17 | PSGT2652Z | NAME PLATE (FOR BB-HCM331E) | |
| 18 | PSKV1039Y2 | LENS COVER | ABS+PC-V0 |
| 19 | PSUP1508Z | LEAD WIRE,FPC CABLE | |
| 20 | PSMH1277Z | CHASSIS | |
| 21 | PSMH1278Z | CHASSIS | |
| 22 | J0KD00000090 | SPACER (FERRITE CORE) | |
| 23 | PSHS1048Z | FELT PARTS,FPC TAPE | |
| 24 | PSHS1051Z | FELT PARTS,CORE TAPE | |
| 25 | NOT USED | | |
| 26 | PSHG1251Z | RUBBER PARTS,CABI SEAL | |
| 27 | PSHG1253Z | RUBBER PARTS,LED SEAL | |
| 28 | PSHX1244Z | WATER SHIELD PARTS,MIC SHEET | |
| 29 | PSHG1252Z | RUBBER PARTS,DOME SEAL | |

## 18.2. ACCESSORIES AND PACKING MATERIALS

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| A1 | PQLV202V | AC ADAPTOR | ⚠ |
| A2 | PFJA02A006Z | POWER CORD (FOR BB-HCM331CE) | ⚠ |
| A2 | PSJA1106Z | POWER CORD (FOR BB-HCM331E) | ⚠ |
| A3 | XZB20X30A05 | PROTECTION COVER(FOR SET etc.) | |
| A4 | PSYCHCM331N | CABLE COVER | |
| A4-1 | PSHG1258Z | RUBBER PARTS,CABLR COVER SEAL | |
| A4-2 | PSHX1201Z | MAGNETIC SHIELD,SHEET | |
| A5 | PQHE5004Y | SCREW | |
| A6 | XZB05X08A03 | PROTECTION COVER(FOR SCREWS) | |
| A7 | XTN26+10GVW | SCREW | |
| A8 | XZB15X20A04 | PROTECTION COVER(FOR SCREWS) | |
| A9 | PSKV1051Z1 | COVER,SUN SHADE | |
| A10 | PSKL1020W | STAND | |
| A11 | PSHG1235Z | TAPE | |
| A12 | PSHG1259Z | RUBBER PARTS,PUTTY | |
| A13 | XZB10X20A04 | PROTECTION COVER(FOR TAPE etc.) | |
| A14 | PSQX3569YCD | INSTRUCTION BOOK, CD-ROM | |
| A15 | PSQW2227Z | LEAFLET (FOR BB-HCM331CE) | |
| A15 | PSQW2274Y | LEAFLET (FOR BB-HCM331E) | |
| A16 | PSQW2285Z | LEAFLET | |
| A17 | PSQX3568Y | INSTRUCTION BOOK | |
| A18 | PSQX3575Y | INSTRUCTION BOOK | |
| A19 | PSQW2290Z | LEAFLET (FOR BB-HCM331CE) | |
| A19 | PSQW2299Z | LEAFLET (FOR BB-HCM331E) | |
| A20 | PSQW2286Z | LEAFLET (FOR BB-HCM331CE ONLY) | |
| P1 | PSPK2312Z | GIFT BOX | |
| P2 | PSPN1177Z | ACCESSORY BOX | |
| P3 | PSPN1176Z | ACCESSORY BOX | |
| P4 | PSPD1302Z | CUSHION | |
| P5 | PSPD1299Z | CUSHION | |

## 18.3. MAIN BOARD PARTS

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| PCB1 | PSWP1CM331CE | MAIN BOARD ASS'Y (RTL) | |
| | | | |
| | | (ICS) | |
| IC101 | PSWIHCM331CE | IC | |
| IC102 | C0JBAF000548 | IC | S |
| IC103 | C1DB00001114 | IC | |
| IC104 | C0EBE0000231 | IC | |
| IC105 | C3ABPG000129 | IC | S |
| IC106 | C0JBAB000636 | IC | |
| IC201 | C0GBF0000020 | IC | |
| IC202 | C1CB00001887 | IC | |
| IC305 | C0BBBA000044 | IC | |
| IC303 | RPI-352 | IC | S |
| IC306 | MN5774 | IC | |
| IC403 | C0DBAFZ00054 | IC | |
| IC404 | C0DBAFZ00054 | IC | |
| IC405 | C1CB00001918 | IC | S |
| IC407 | C0CBCAD00039 | IC | |
| | | | |
| | | (TRANSISTORS) | |
| Q301 | PQVTDTC143E | TRANSISTOR(SI) | S |
| Q401 | B1DHCD000018 | TRANSISTOR(SI) | |
| Q402 | B1DHCD000018 | TRANSISTOR(SI) | |
| Q501 | B1GBGFCJ0002 | TRANSISTOR(SI) | |
| Q503 | PQVTDTA143EU | TRANSISTOR(SI) | S |
| Q504 | PQVTDTA143EU | TRANSISTOR(SI) | S |
| | | | |
| | | (DIODES) | |
| D401 | MA111 | DIODE(SI) | S |
| D402 | MA741WK | DIODE(SI) | S |
| D403 | MA736 | DIODE(SI) | S |
| D404 | MA736 | DIODE(SI) | S |
| DA301 | MA143A | DIODE(SI) | S |
| | | | |
| | | (BATTERY) | |
| BAT401 | BR-2032-1VC | LITHIUM BATTERY | |
| | | | |
| | | (CAPACITORS) | |
| C102 | ECJ1VF1C104Z | 0.1 | |
| C103 | F1J0J1060006 | 10 | |
| C104 | ECJ1VC1H101J | 100p | |
| C105 | ECJ1VF1C104Z | 0.1 | |
| C110 | ECJ1VC1H180J | 18p | |
| C111 | ECJ1VC1H200J | 20p | |
| C112 | ECJ1VF1A105Z | 1 | |
| C113 | ECJ1VF1C104Z | 0.1 | |
| C114 | F1J0J1060006 | 10 | |
| C115 | ECJ1VB1C104K | 0.1 | |
| C117 | ECJ1VF1C104Z | 0.1 | |
| C118 | ECJ1VF1C224Z | 0.22 | |
| C120 | ECJ1VF1C104Z | 0.1 | |
| C121 | ECJ1VB1E103K | 0.01 | |
| C122 | ECJ1VB1E103K | 0.01 | |
| C123 | ECJ1VF1C104Z | 0.1 | |
| C124 | ECJ1VF1C104Z | 0.1 | |
| C125 | ECJ1VB1E103K | 0.01 | |
| C126 | ECJ1VB1E103K | 0.01 | |

| | | | |
|---|---|---|---|
| | | | |

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| C128 | ECJ1VF1C104Z | 0.1 | |
| C129 | ECJ1VF1C104Z | 0.1 | |
| C130 | F1J0J1060006 | 10 | |
| C131 | ECJ1VC1H101J | 100p | |
| C132 | ECJ1VF1C104Z | 0.1 | |
| C133 | ECJ1VF1C104Z | 0.1 | |
| C134 | ECJ1VF1C104Z | 0.1 | |
| C135 | ECJ1VF1C104Z | 0.1 | |
| C136 | ECJ1VF1C104Z | 0.1 | |
| C137 | ECJ1VB1E103K | 0.01 | |
| C138 | ECJ1VB1E103K | 0.01 | |
| C139 | ECJ1VF1C104Z | 0.1 | |
| C140 | ECJ1VF1C104Z | 0.1 | |
| C141 | ECJ1VB1E103K | 0.01 | |
| C142 | ECJ1VB1E103K | 0.01 | |
| C143 | ECJ1VF1C104Z | 0.1 | |
| C144 | ECJ1VF1C104Z | 0.1 | |
| C145 | ECJ1VB1E103K | 0.01 | |
| C146 | ECJ1VB1E103K | 0.01 | |
| C147 | ECJ1VF1C104Z | 0.1 | |
| C148 | ECJ1VF1C104Z | 0.1 | |
| C149 | ECJ1VF1C104Z | 0.1 | |
| C150 | ECJ1VF1C104Z | 0.1 | |
| C151 | ECJ1VB1E103K | 0.01 | |
| C152 | ECJ1VB1E103K | 0.01 | |
| C153 | ECJ1VF1C104Z | 0.1 | |
| C154 | ECJ1VF1C104Z | 0.1 | |
| C155 | ECJ1VB1E103K | 0.01 | |
| C156 | ECJ1VB1E103K | 0.01 | |
| C157 | ECJ1VF1C104Z | 0.1 | |
| C158 | ECJ1VF1C104Z | 0.1 | |
| C159 | F1J0J1060006 | 10 | |
| C160 | F1J0J1060006 | 10 | |
| C161 | ECJ1VC1H220J | 22p | |
| C162 | ECJ1VF1A105Z | 1 | |
| C164 | ECJ1VF1C104Z | 0.1 | |
| C165 | ECJ1VB1E103K | 0.01 | |
| C166 | ECJ1VF1C104Z | 0.1 | |
| C167 | ECJ1VB1E103K | 0.01 | |
| C168 | ECJ1VF1C104Z | 0.1 | |
| C169 | ECJ1VB1E103K | 0.01 | |
| C170 | ECJ1VF1C104Z | 0.1 | |
| C171 | ECJ1VF1C104Z | 0.1 | |
| C172 | ECJ1VF1C104Z | 0.1 | |
| C190 | ECJ1VF1C104Z | 0.1 | |
| C192 | ECJ1VB1E103K | 0.01 | |
| C193 | ECJ1VF1C104Z | 0.1 | |
| C201 | ECJ1VF1C104Z | 0.1 | |
| C202 | ECJ1VF1C104Z | 0.1 | |
| C203 | ECJ1VC1H120J | 12p | |
| C204 | ECJ1VC1H120J | 12p | |
| C206 | ECJ1VF1C104Z | 0.1 | |
| C207 | ECJ1VB1E103K | 0.01 | |
| C208 | F1J0J1060006 | 10 | |
| C213 | ECJ1VC1H040C | 4p | |
| C214 | ECJ1VF1C104Z | 0.1 | |
| C215 | ECJ1VF1C104Z | 0.1 | |

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| C224 | ECJ1VF1C104Z | 0.1 | |
| C225 | ECJ1VF1C104Z | 0.1 | |
| C226 | ECJ1VF1C104Z | 0.1 | |
| C227 | ECJ1VF1C104Z | 0.1 | |
| C307 | ECJ1VF1C104Z | 0.1 | |
| C320 | ECJ1VF1C104Z | 0.1 | |
| C322 | ECJ1VF1C104Z | 0.1 | |
| C323 | F1J0J1060006 | 10 | |
| C324 | ECJ1VC1H101J | 100p | |
| C325 | ECJ1VF1C104Z | 0.1 | |
| C327 | ECUV0J105KBV | 1 | S |
| C330 | ECJ1VC1H150J | 15p | |
| C401 | F2B1E1020001 | 1000 | |
| C402 | PFCX1EY106ZF | 10 | S |
| C403 | PFCX1EY106ZF | 10 | S |
| C404 | ECJ1VF1E104Z | 0.1 | |
| C405 | ECJ1VF1E104Z | 0.1 | |
| C406 | PFCX1EY106ZF | 10 | S |
| C407 | PFCX1EY106ZF | 10 | S |
| C408 | ECJ1VF1C104Z | 0.1 | |
| C411 | ECJ1VB1E103K | 0.01 | |
| C412 | ECJ1VB1E103K | 0.01 | |
| C413 | F4Z0J4760001 | 47 | |
| C414 | F4Z0J4760001 | 47 | |
| C415 | ECJ1VF1C104Z | 0.1 | |
| C416 | ECJ1VF1C104Z | 0.1 | |
| C417 | F1J0J1060006 | 10 | |
| C418 | F1J0J1060006 | 10 | |
| C420 | ECJ1VF1A105Z | 1 | |
| C422 | ECJ1VF1C104Z | 0.1 | |
| C424 | ECJ1VF1C104Z | 0.1 | |
| C426 | F1J0J1060006 | 10 | |
| C444 | ECJ1VF1A105Z | 1 | |
| C501 | ECJ1VF1C104Z | 0.1 | |
| C502 | F1J0J1060006 | 10 | |
| C503 | ECJ1VF1C104Z | 0.1 | |
| C504 | ECJ1VF1C104Z | 0.1 | |
| C506 | ECJ1VC1H221J | 220p | |
| C510 | ECJ1VC1H221J | 220p | |
| C516 | ECJ1VC1H221J | 220p | |
| C522 | ECJ1VC1H221J | 220p | |
| C540 | ECJ1VB1H102K | 0.001 | |
| C543 | ECJ1VF1C104Z | 0.1 | |
| C544 | ECJ1VF1C104Z | 0.1 | |
| C545 | ECJ1VF1C104Z | 0.1 | |
| C546 | ECJ1VF1C104Z | 0.1 | |
| | | | |
| | | (CONNECTORS AND JACKS) | |
| CN201 | K1MN04B00042 | CONNECTOR,4P | |
| CN301 | K1NA09E00022 | CONNECTOR,9P | |
| CN501 | K1MN33B00016 | CONNECTOR,33P | |
| CN502 | K1MN27B00030 | CONNECTOR,27P | |
| | | | |
| | | (COILS AND CERAMIC FILTER) | |
| L101 | G1C100K00031 | COIL | |
| L201 | J0JBC0000071 | CERAMIC FILTER | |
| L202 | G1CR12J00003 | COIL | |

| | | | |
|---|---|---|---|
| [illegible] | [illegible] | [illegible] | |

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| L203 | J0JBC0000071 | CERAMIC FILTER | |
| L401 | G1C220ZA0011 | COIL | |
| L402 | G1C220ZA0011 | COIL | |
| L403 | G1C100M00027 | COIL | |
| L404 | G1C100M00027 | COIL | |
| L407 | G1C100K00031 | COIL | |
| L501 | G1C100K00031 | COIL | |
| L502 | PQLQR1RS241 | COIL | |
| R101 | PQLQR1RM471 | COIL | S |
| | | | |
| | | (RESISITORS) | |
| C109 | ERJ3GEY0R00 | 0 | |
| R103 | ERJ3GEY0R00 | 0 | |
| R107 | ERJ3GEYJ103 | 10k | |
| R109 | ERJ3GEYJ103 | 10k | |
| R110 | ERJ3GEYJ103 | 10k | |
| R111 | ERJ3GEYJ103 | 10k | |
| R115 | ERJ3GEYJ103 | 10k | |
| R116 | ERJ3GEYJ103 | 10k | |
| R117 | ERJ3GEYJ103 | 10k | |
| R119 | ERJ3GEYJ103 | 10k | |
| R120 | ERJ3GEYJ101 | 100 | |
| R121 | ERJ3GEYJ105 | 1M | |
| R122 | ERJ3GEYJ103 | 10k | |
| R123 | ERJ3GEYJ103 | 10k | |
| R124 | ERJ3GEYJ101 | 100 | |
| R125 | ERJ3GEY0R00 | 0 | |
| R126 | ERJ3GEYJ271 | 270 | |
| R130 | ERJ3GEYJ330 | 33 | |
| R131 | ERJ3GEY0R00 | 0 | |
| R132 | ERJ3GEYJ103 | 10k | |
| R133 | ERJ3GEYJ473 | 47k | |
| R134 | ERJ3GEYJ473 | 47k | |
| R135 | ERJ3GEYJ473 | 47k | |
| R138 | ERJ3GEY0R00 | 0 | |
| R139 | ERJ3GEYJ103 | 10k | |
| R140 | ERJ3GEYJ473 | 47k | |
| R201 | ERJ3GEYJ103 | 10k | |
| R202 | ERJ3GEYJ102 | 1k | |
| R203 | ERJ3GEYJ103 | 10k | |
| R204 | ERJ3EKF1102 | 0 | |
| R205 | ERJ3EKF2001 | 0 | |
| R206 | ERJ3GEY0R00 | 0 | |
| R207 | ERJ3GEY0R00 | 0 | |
| R208 | ERJ3GEY0R00 | 0 | |
| R209 | ERJ3GEY0R00 | 0 | |
| R210 | ERJ3EKF1541 | 0 | |
| R211 | ERJ3GEYJ103 | 10k | |
| R212 | ERJ3GEYJ103 | 10k | |
| R213 | ERJ3GEYJ103 | 10k | |
| R214 | ERJ3GEYJ103 | 10k | |
| R215 | ERJ3EKF51R1 | 0 | |
| R216 | ERJ3EKF51R1 | 0 | |
| R217 | ERJ3EKF61R9 | 0 | |
| R218 | ERJ3EKF61R9 | 0 | |
| R219 | ERJ3GEYJ470 | 47 | |
| R220 | ERJ3GEYJ470 | 47 | |

| | | | |
|---|---|---|---|
| [redacted] | [redacted] | [redacted] | |

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| R221 | ERJ3GEYJ470 | 47 | |
| R223 | ERJ3GEYJ470 | 47 | |
| R225 | ERJ3GEYJ470 | 47 | |
| R226 | ERJ3GEYJ470 | 47 | |
| R227 | ERJ3GEY0R00 | 0 | |
| R228 | ERJ3GEY0R00 | 0 | |
| R229 | ERJ3GEY0R00 | 0 | |
| R230 | ERJ3GEY0R00 | 0 | |
| R310 | ERJ3GEYJ103 | 10k | |
| R311 | ERJ3GEYJ103 | 10k | |
| R312 | ERJ3GEY0R00 | 0 | |
| R313 | ERJ3GEY0R00 | 0 | |
| R314 | ERJ3GEY0R00 | 0 | |
| R315 | ERJ3GEY0R00 | 0 | |
| R316 | ERJ3GEYJ103 | 10k | |
| R317 | ERJ3GEY0R00 | 0 | |
| R318 | ERJ3GEYJ103 | 10k | |
| R319 | ERJ3GEYJ103 | 10k | |
| R320 | ERJ3GEYJ104 | 100k | |
| R321 | ERJ3GEYJ104 | 100k | |
| R322 | ERJ3GEYJ472 | 4.7k | |
| R323 | ERJ3GEYJ103 | 10k | |
| R325 | ERJ3GEYJ472 | 4.7k | |
| R326 | ERJ3GEYJ104 | 100k | |
| R328 | ERJ3GEYJ104 | 100k | |
| R329 | ERJ3GEYJ103 | 10k | |
| R330 | ERJ3GEYJ103 | 10k | |
| R331 | ERJ3GEYJ101 | 100 | |
| R333 | ERJ3GEYJ470 | 47 | |
| R334 | ERJ3GEYJ470 | 47 | |
| R335 | ERJ3GEYJ470 | 47 | |
| R336 | ERJ3GEYJ470 | 47 | |
| R337 | ERJ3GEYJ470 | 47 | |
| R338 | ERJ3GEYJ470 | 47 | |
| R339 | ERJ3GEYJ470 | 47 | |
| R340 | ERJ3GEYJ470 | 47 | |
| R341 | ERJ3GEYJ103 | 10k | |
| R342 | ERJ3GEYJ103 | 10k | |
| R344 | ERJ3GEY0R00 | 0 | |
| R345 | ERJ3GEYJ103 | 10k | |
| R401 | ERJ3GEYJ152 | 1.5k | |
| R402 | ERJ3GEYJ100 | 10 | |
| R403 | ERJ3GEYJ100 | 10 | |
| R404 | ERJ3GEYJ470 | 47 | |
| R405 | ERJ3GEYJ470 | 47 | |
| R406 | ERJ3GEY0R00 | 0 | |
| R407 | ERJ3GEY0R00 | 0 | |
| R408 | ERJ3GEYJ332 | 3.3k | |
| R409 | ERJ3EKF2702 | 0 | |
| R410 | ERJ3EKF1202 | 0 | |
| R411 | ERJ3EKF4702 | 0 | |
| R412 | ERJ3EKF2002 | 0 | |
| R413 | ERJ3GEYJ272 | 2.7k | |
| R414 | ERJ3GEYJ272 | 2.7k | |
| R416 | PQ4R10XJ271 | 270 | S |
| R501 | ERJ3GEYJ470 | 47 | |
| R502 | ERJ3GEYJ470 | 47 | |

| | | | |
|---|---|---|---|
| [illegible] | [illegible] | [illegible] | |

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| R503 | ERJ3GEYJ470 | 47 | |
| R504 | ERJ3GEYJ470 | 47 | |
| R505 | ERJ3GEYJ470 | 47 | |
| R506 | ERJ3GEYJ470 | 47 | |
| R507 | ERJ3GEYJ470 | 47 | |
| R508 | ERJ3GEYJ470 | 47 | |
| R509 | ERJ3GEYJ470 | 47 | |
| R510 | ERJ3GEYJ470 | 47 | |
| R511 | ERJ3GEY0R00 | 0 | |
| R512 | ERJ3GEY0R00 | 0 | |
| R513 | ERJ3GEY0R00 | 0 | |
| R514 | ERJ3GEY0R00 | 0 | |
| R515 | ERJ3GEY0R00 | 0 | |
| R516 | ERJ3GEYJ470 | 47 | |
| R518 | ERJ3GEYJ101 | 100 | |
| R520 | ERJ3GEYJ561 | 560 | |
| R521 | ERJ3GEYJ561 | 560 | |
| R522 | ERJ3GEYJ470 | 47 | |
| R523 | ERJ3GEYJ470 | 47 | |
| R525 | ERJ3GEYJ470 | 47 | |
| R526 | ERJ3GEYJ470 | 47 | |
| R529 | ERJ3GEYJ103 | 10k | |
| R530 | ERJ3GEYJ103 | 10k | |
| R531 | ERJ3GEYJ470 | 47 | |
| R532 | ERJ3GEY0R00 | 0 | |
| R533 | ERJ3GEYJ470 | 47 | |
| R534 | ERJ3GEY0R00 | 0 | |
| R535 | ERJ3GEY0R00 | 0 | |
| R536 | ERJ3GEYJ470 | 47 | |
| R537 | ERJ3GEY0R00 | 0 | |
| R538 | ERJ3GEYJ470 | 47 | |
| R539 | ERJ3GEYJ332 | 3.3k | |
| R540 | ERJ3GEYJ332 | 3.3k | |
| | | | |
| | | (COMPONENTS PARTS) | |
| RA201 | D1H84704A037 | RESISTOR ARRAY | |
| RA202 | D1H84704A037 | RESISTOR ARRAY | |
| RA301 | D1H83304A036 | RESISTOR ARRAY | |
| RA302 | D1H83304A036 | RESISTOR ARRAY | |
| RA303 | D1H83304A036 | RESISTOR ARRAY | |
| RA304 | D1H83304A036 | RESISTOR ARRAY | |
| RA305 | D1H83304A036 | RESISTOR ARRAY | |
| RA306 | D1H83304A036 | RESISTOR ARRAY | |
| RA307 | D1H81034A037 | RESISTOR ARRAY | |
| RA502 | PSLQR2C601MT | RESISTOR ARRAY | |
| RA503 | PSLQR2C601MT | RESISTOR ARRAY | |
| | | | |
| | | (SWITCH) | |
| SW101 | EVQPSM02K | SWITCH | |
| SW102 | EVQPSM02K | SWITCH | |
| | | | |
| | | (CRYSTAL OSCILLATORS) | |
| X101 | H0J163500016 | CRYSTAL OSCILLATOR | |
| X201 | H0J250500044 | CRYSTAL OSCILLATOR | |
| | | | |
| | | (OHTERS) | |
| E1 | PSHX1245Z | PLASTIC PARTS,SHEET | |

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| E2 | PSHX1205Z | PLASTIC PARTS,SHEET | |
| E3 | PSHR1325Z | SPACER | |

## 18.4. I/O BOARD PARTS

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| PCB2 | PSWP2CM331CE | I/O BOARD ASS'Y (RTL) | |
| | | | |
| | | (ICS) | |
| IC601 | C1CB00001622 | IC | |
| IC602 | AN6123MS | IC | |
| IC603 | AN6123MS | IC | |
| | | | |
| | | (TRANSISTORS) | |
| Q601 | PQVTDTC143E | TRANSISTOR(SI) | S |
| Q602 | PQVTDTC143E | TRANSISTOR(SI) | S |
| Q603 | B1ABCF000103 | TRANSISTOR(SI) | |
| | | | |
| | | (DIODES) | |
| D601 | MA736 | DIODE(SI) | S |
| DA601 | MA143A | DIODE(SI) | S |
| DA602 | MA143A | DIODE(SI) | S |
| DA603 | MA143A | DIODE(SI) | S |
| LED601 | B3AKB0000008 | LED | |
| | | | |
| | | (CAPACITORS) | |
| C601 | ECUV1H100DCV | 10P | S |
| C602 | ECJ1VF1C104Z | 0.1 | |
| C603 | ECUV1H121JCV | 120P | |
| C604 | ECUV1H121JCV | 120P | |
| C605 | ECJ1VF1C104Z | 0.1 | |
| C606 | ECST0JX476 | 47 | |
| C607 | PQCUV1A105KB | 1 | S |
| C608 | ECJ1VF1C104Z | 0.1 | |
| C609 | ECST0JX476 | 47 | |
| C610 | ECJ1VF1C104Z | 0.1 | |
| C611 | F1K3A222A002 | 0.0022 | |
| C612 | ECJ1VB1C473K | 0.047 | |
| C613 | ECJ1VB1C473K | 0.047 | |
| C614 | ECUV0J105KBV | 1 | S |
| C615 | ECJ1VC1H331J | 330p | |
| C617 | ECJ1VC1H331J | 330p | S |
| C618 | ECUV1C474KBV | 0.47 | |
| C619 | ECUV1C474KBV | 0.47 | |
| C620 | F1J0J1060006 | 10 | |
| C621 | ECJ1VF1C104Z | 0.1 | |
| C622 | ECJ1VF1C104Z | 0.1 | |
| C623 | F1J0J1060006 | 10 | |
| C624 | F1J0J1060006 | 10 | |
| C625 | ECJ1VF1C104Z | 0.1 | |
| C626 | ECJ1VF1C104Z | 0.1 | |
| C627 | ECJ1VB1H122K | 0.0012 | |
| C628 | ECJ1VB1H122K | 0.0012 | |
| C629 | ECUV0J105KBV | 1 | S |
| C630 | ECJ1VF1E104Z | 0.1 | |

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| C631 | F1J0J1060006 | 10 | |
| C632 | ECUV1A224KBV | 0.22 | S |
| C633 | ECJ1VF1E104Z | 0.1 | |
| C634 | ECUV0J105KBV | 1 | S |
| C635 | ECUV0J105KBV | 1 | S |
| C636 | ECUV0J105KBV | 1 | S |
| C637 | ECUV0J105KBV | 1 | S |
| C638 | ECUV0J105KBV | 1 | S |
| C639 | PQCUV1A105KB | 1 | S |
| C640 | ECJ1VF1C104Z | 0.1 | |
| C641 | F1J0J1060006 | 10 | |
| C642 | F1J0J1060006 | 10 | |
| C643 | ECJ1VB1H102K | 0.1 | |
| C645 | ECJ0EC1H100D | 10P | |
| C646 | ECJ0EC1H100D | 10P | |
| C647 | ECJ0EC1H100D | 10P | |
| C648 | ECJ0EC1H100D | 10P | |
| | | | |
| | | (CONNECTORS AND JACKS) | |
| CN601 | K4BC06B00047 | JACK | |
| CN602 | PFJJ1B01Z | JACK | S |
| CN603 | PQJJ1D010Z | JACK | S |
| CN604 | K2HC103B0061 | JACK | |
| CN605 | K2LC108B0046 | JACK | |
| CN606 | PQJS33A62Z | CONNECTOR,33P | |
| CN607 | K1KA02AA0229 | CONNECTOR,2P | |
| | | | |
| | | (THERMISTOR) | |
| IP601 | D4FBR2000002 | THERMISTOR | |
| | | | |
| | | (COILS AND CERAMIC FILTER) | |
| L601 | G0B150G00002 | COIL | |
| L602 | G1C6R8Z00005 | COIL | |
| L603 | J0JCC0000079 | CERAMIC FILTER | |
| L604 | J0JCC0000079 | CERAMIC FILTER | |
| L605 | J0JCC0000079 | CERAMIC FILTER | |
| L606 | G1C100K00031 | COIL | |
| L608 | PQLQR1RS241 | COIL | S |
| L609 | J0JCC0000079 | CERAMIC FILTER | |
| L610 | J0JCC0000079 | CERAMIC FILTER | |
| L611 | J0JCC0000079 | CERAMIC FILTER | |
| L612 | J0JCC0000079 | CERAMIC FILTER | |
| R641 | PQLQR1RS241 | COIL | S |
| R642 | J0JCC0000079 | IC FILTER | |
| R643 | J0JCC0000079 | IC FILTER | |
| R644 | J0JCC0000079 | IC FILTER | |
| | | | |
| | | (RESISITORS) | |
| R601 | ERJ3GEYJ750 | 75 | |
| R602 | ERJ3GEYJ750 | 75 | |
| R603 | ERJ3GEYJ222 | 2.2k | |
| R604 | ERJ3GEYJ222 | 2.2k | |
| R606 | ERJ3GEYJ102 | 1k | |
| R607 | ERJ3GEYJ102 | 1k | |
| R608 | PQ4R18XJ100 | 10 | S |
| R610 | ERJ3GEYJ103 | 10k | |
| R611 | ERJ3GEYJ103 | 10k | |

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| R612 | ERJ3GEYJ473 | 47k | |
| R613 | ERJ3GEYJ203 | 20k | |
| R614 | ERJ3GEYJ154 | 150k | |
| R615 | ERJ3GEYJ750 | 75 | |
| R616 | ERJ3GEYJ750 | 75 | |
| R617 | ERJ3GEYJ154 | 150k | |
| R618 | ERJ3GEYJ680 | 68 | |
| R619 | ERJ3GEYJ820 | 82 | |
| R621 | ERJ3GEYJ332 | 3.3k | |
| R622 | ERJ3GEYJ332 | 3.3k | |
| R623 | ERJ3GEYJ105 | 1M | |
| R624 | ERJ3GEYJ105 | 1M | |
| R625 | ERJ3GEYJ203 | 20k | |
| R626 | ERJ3GEYJ203 | 20k | |
| R627 | ERJ3GEYJ103 | 10k | |
| R628 | ERJ3GEYJ103 | 10k | |
| R629 | ERJ3GEYJ104 | 100k | |
| R630 | ERJ3GEYJ105 | 1M | |
| R631 | ERJ3GEYJ104 | 100k | |
| R632 | ERJ3GEYJ104 | 100k | |
| R633 | ERJ3GEY0R00 | 0 | |
| R634 | ERJ3GEY0R00 | 0 | |
| R635 | ERJ3GEY0R00 | 0 | |
| R636 | ERJ3GEY0R00 | 0 | |
| R637 | ERJ3GEY0R00 | 0 | |
| R645 | ERJ3GEYJ561 | 560 | |
| | | | |
| | | (VARISTORS) | |
| SA601 | D4ZZ00000024 | VARISTOR (SAUGE ABSORBER) | |
| SA602 | D4ZZ00000024 | VARISTOR (SAUGE ABSORBER) | |
| SA603 | D4ZZ00000024 | VARISTOR (SAUGE ABSORBER) | |
| SA604 | D4ZZ00000024 | VARISTOR (SAUGE ABSORBER) | |
| SA605 | D4ZZ00000024 | VARISTOR (SAUGE ABSORBER) | |
| SA606 | D4ZZ00000024 | VARISTOR (SAUGE ABSORBER) | |
| SA607 | D4ZZ00000024 | VARISTOR (SAUGE ABSORBER) | |
| SA608 | D4ZZ00000024 | VARISTOR (SAUGE ABSORBER) | |
| | | | |
| | | (TRANSFORMER) | |
| T601 | G5B1C0000011 | TRANSFORMER | |

## 18.5. SENSOR BOARD PARTS

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| PCB3 | PSWP3CM331CE | SENSOR BOARD ASS'Y (RTL) | |
| | | | |
| | | (ICS) | |
| IC71 | B3NAA0000003 | IC | |
| | | | |
| | | (TRANSISTORS) | |
| Q71 | PQVTDTC143E | TRANSISTOR(SI) | S |
| | | | |
| | | (CAPACITORS) | |
| C71 | ECJ1VF1A105Z | 1 | |
| C72 | ECJ1VF1C104Z | 0.1 | |
| | | | |
| | | (CONNECTORS) | |
| CN71 | K1MN08B00012 | CONNECTOR, 8P | |
| CN72 | K1MN04B00042 | CONNECTOR, 4P | |
| | | | |
| | | | |
| | | (COILS) | |
| L71 | PQLQR1RS601T | COIL | S |
| L72 | PQLQR1RS601T | COIL | S |
| L73 | PQLQR1RS601T | COIL | S |
| L74 | PQLQR1RS601T | COIL | S |
| | | | |
| | | (RESISITORS) | |
| R71 | ERJ3GEY0R00 | 0 | |
| R72 | ERJ3GEY0R00 | 0 | |
| R73 | ERJ3GEYJ101 | 100 | |

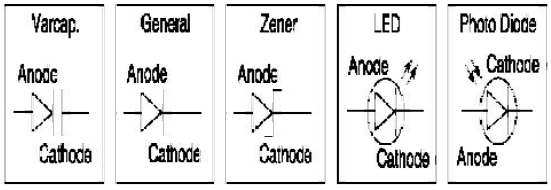
## 18.6. GREASE

| Ref. No. | Part No. | Part Name & Description |
|---|---|---|
| | PSZYC10A | GREASE |

# 19. FOR THE SCHEMATIC DIAGRAM

**Note:**

1. DC voltage measurements are taken with an oscilloscope or a tester with a ground.
2. The schematic diagrams and circuit board may be modified at any time with the development of new technology.




Important safety notice
Components identified by ⚠ mark have special characteristics important for safety. When replacing any of there components, use only manufacturer's specified parts.

# 20. SCHEMATIC DIAGRAM

## 20.1. WAVEFORM

# 21. CIRCUIT BOARD

## 21.1. MAIN BOARD (COMPONENT VIEW)

## 21.2. MAIN BOARD (BOTTOM VIEW)

## 21.3. I/O BOARD (COMPONENT VIEW)

## 21.4. I/O BOARD (BOTTOM VIEW)

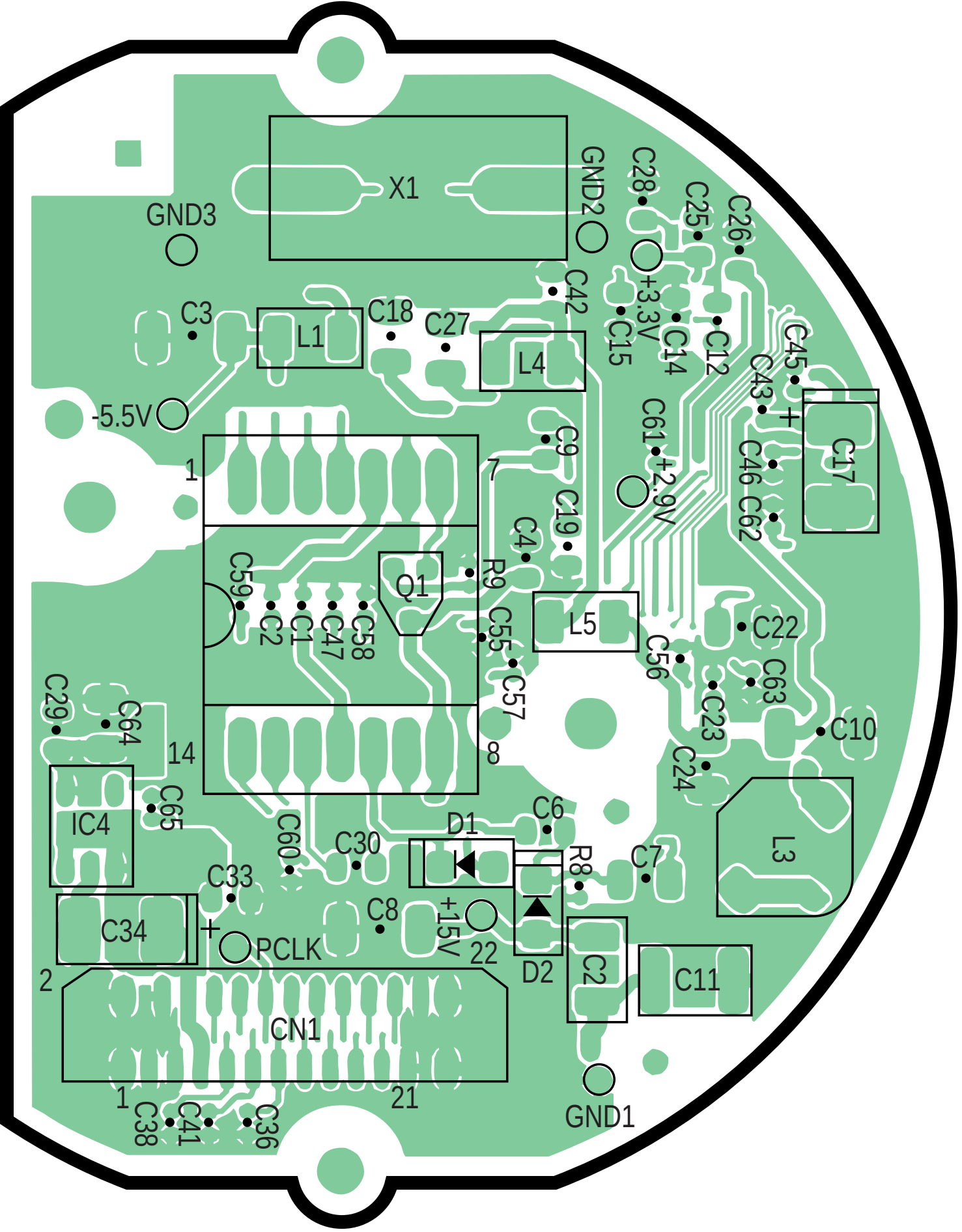
## 21.5. SENSOR BOARD (COMPONENT VIEW)

## 21.6. SENSOR BOARD (BOTTOM VIEW)

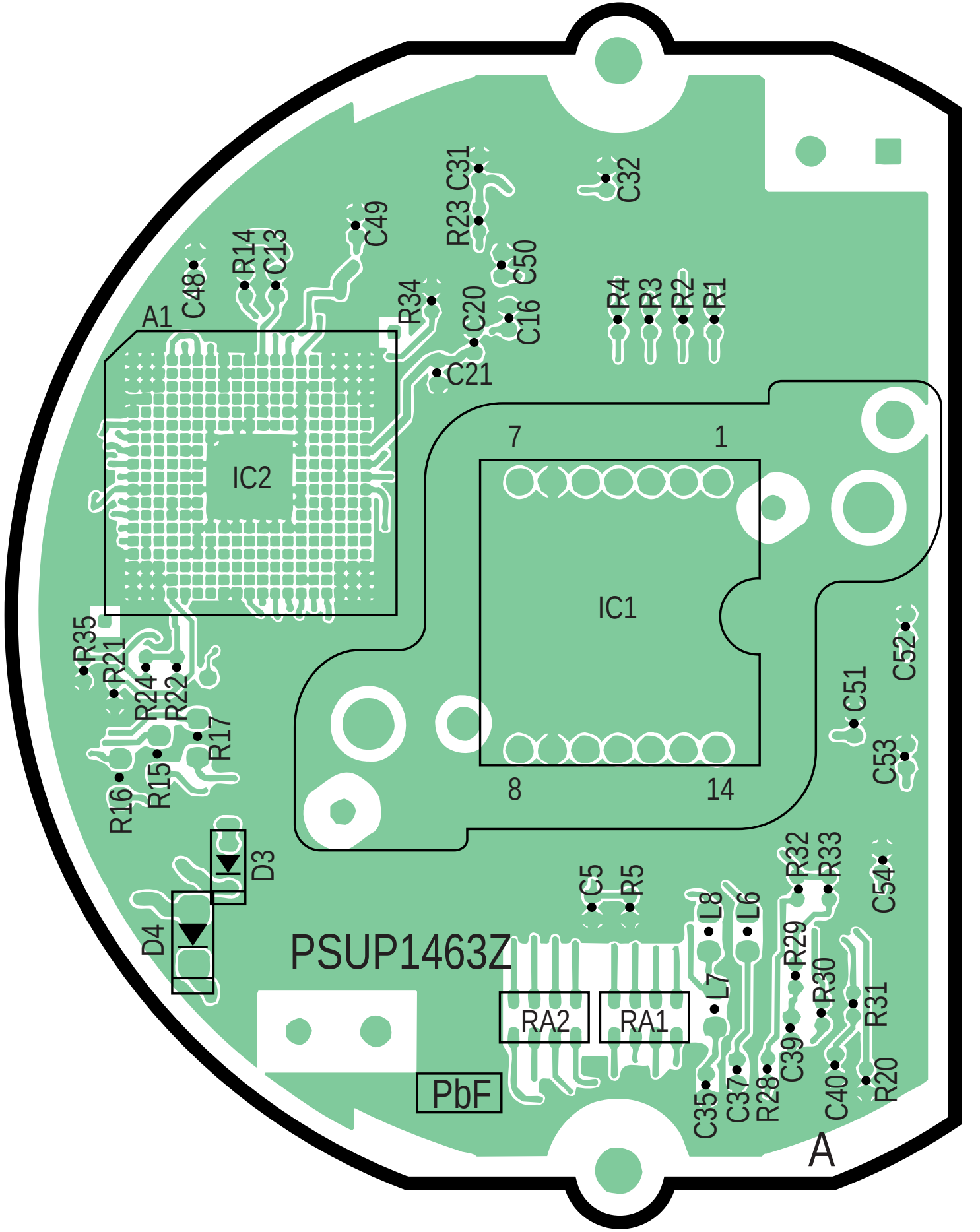
## 21.7. CAMERA BOARD (COMPONENT VIEW)

## 21.8. CAMERA BOARD (BOTTOM VIEW)

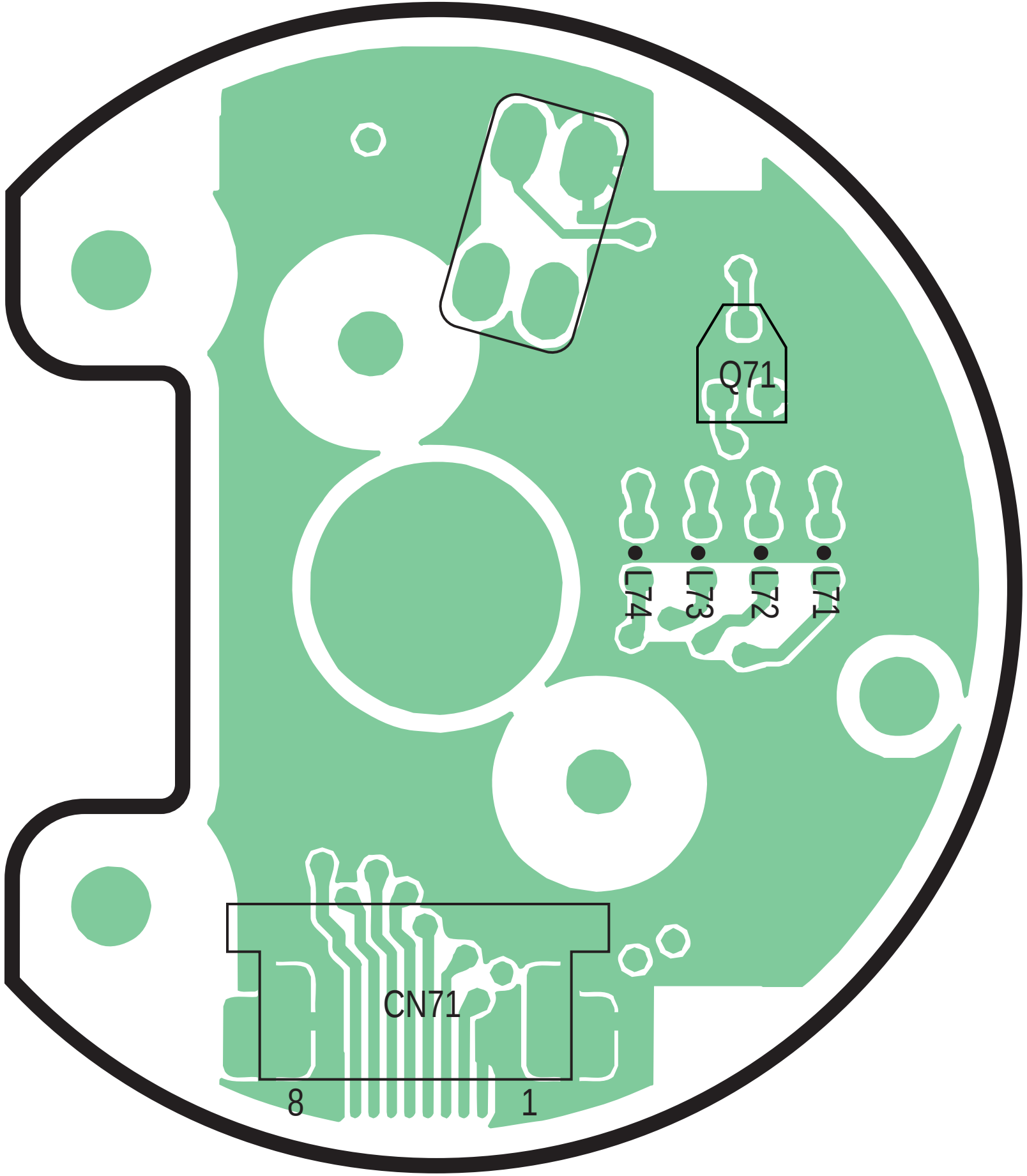
**A BBHCM331CE/E**



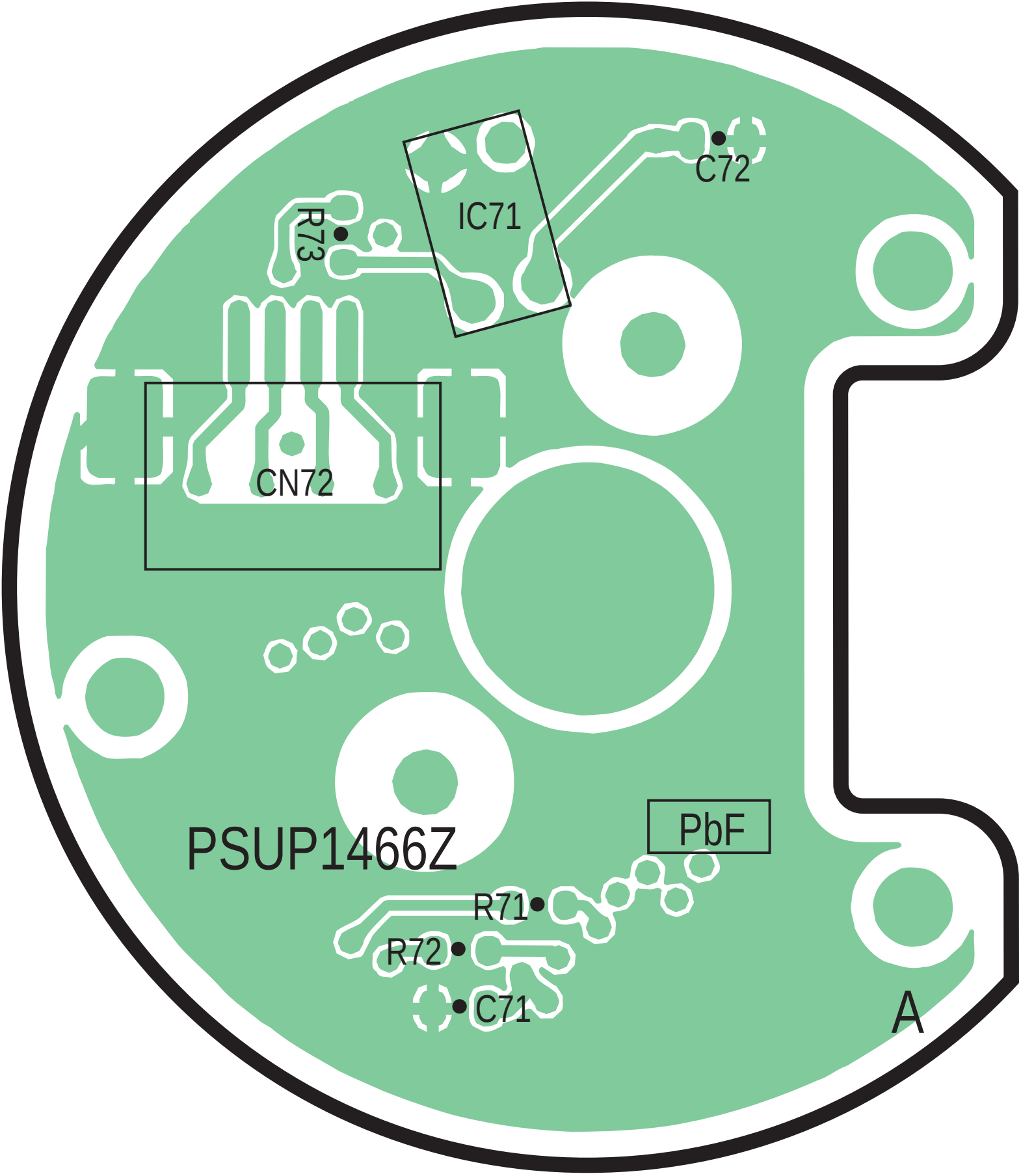

BB-HCM331 CAMERA BOARD



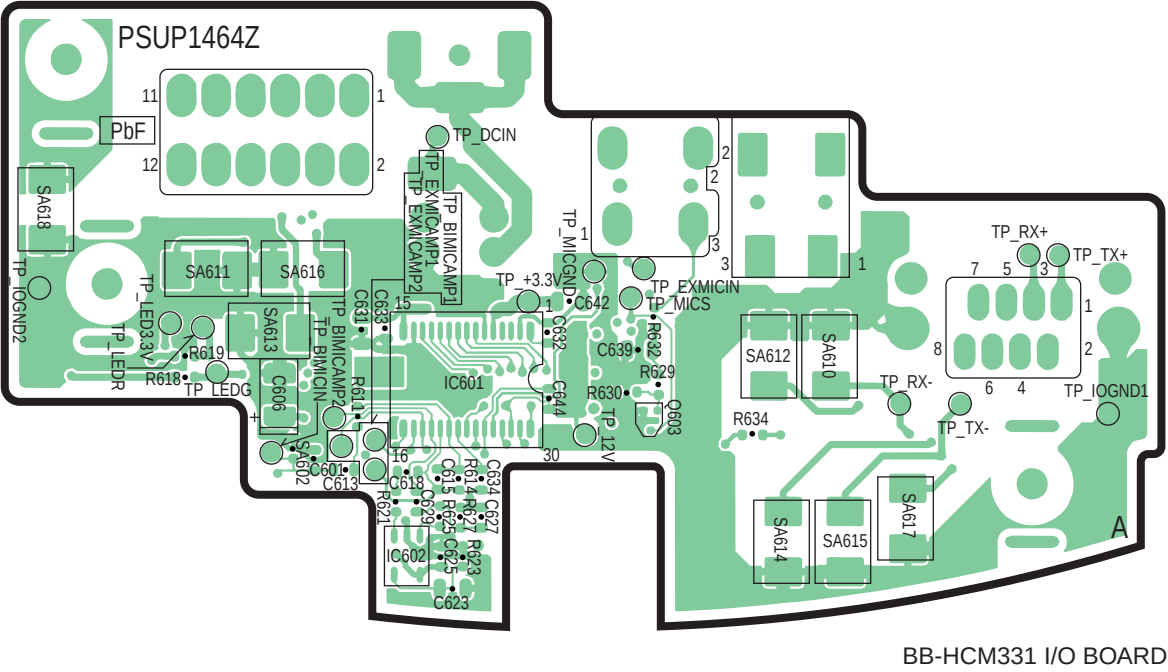

BB-HCM331 CAMERA BOARD

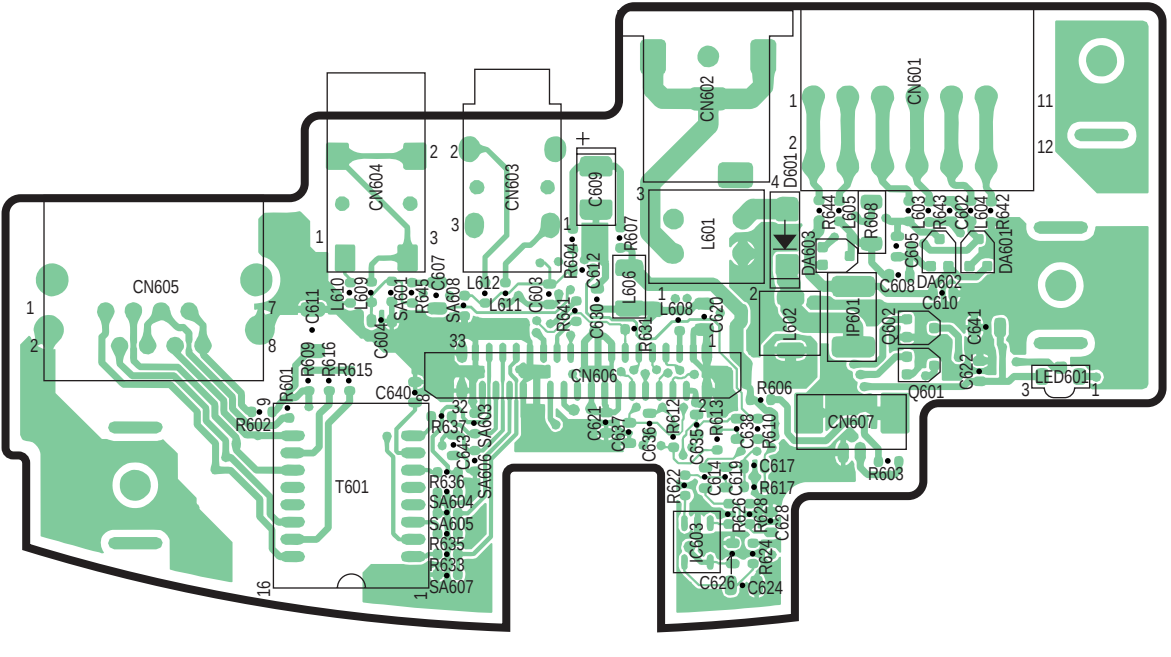



BB-HCM331 SENSOR BOARD

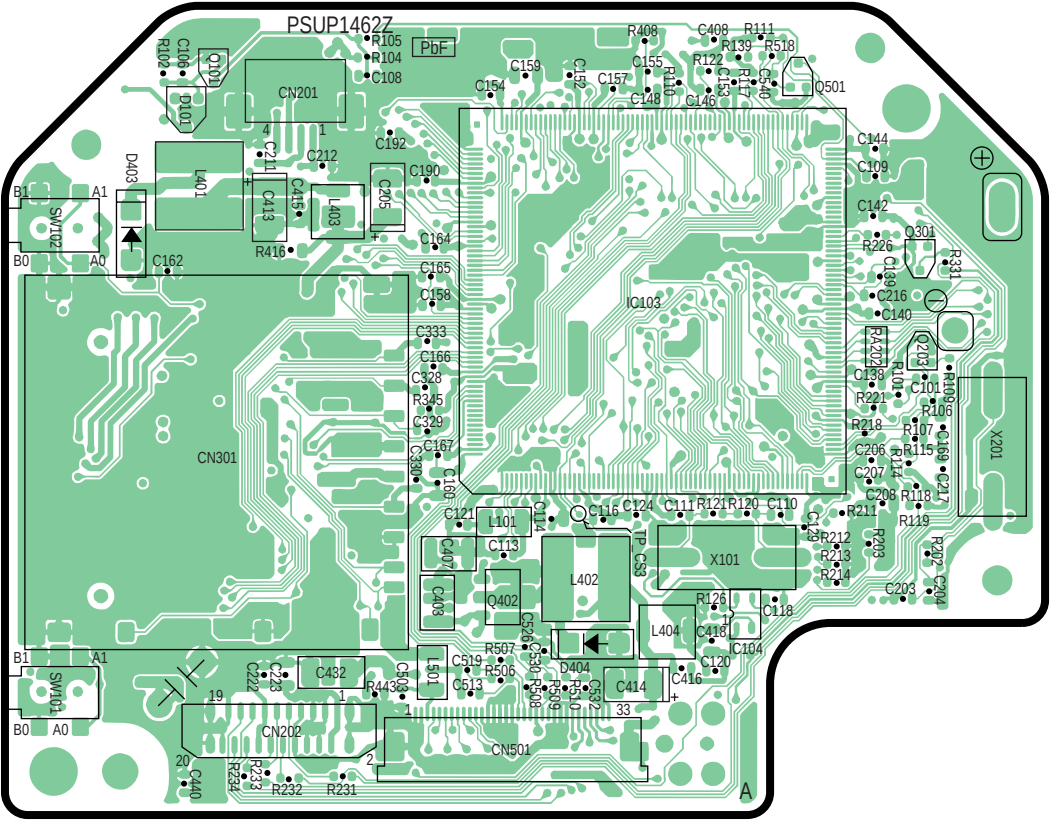



BB-HCM331 SENSOR BOARD

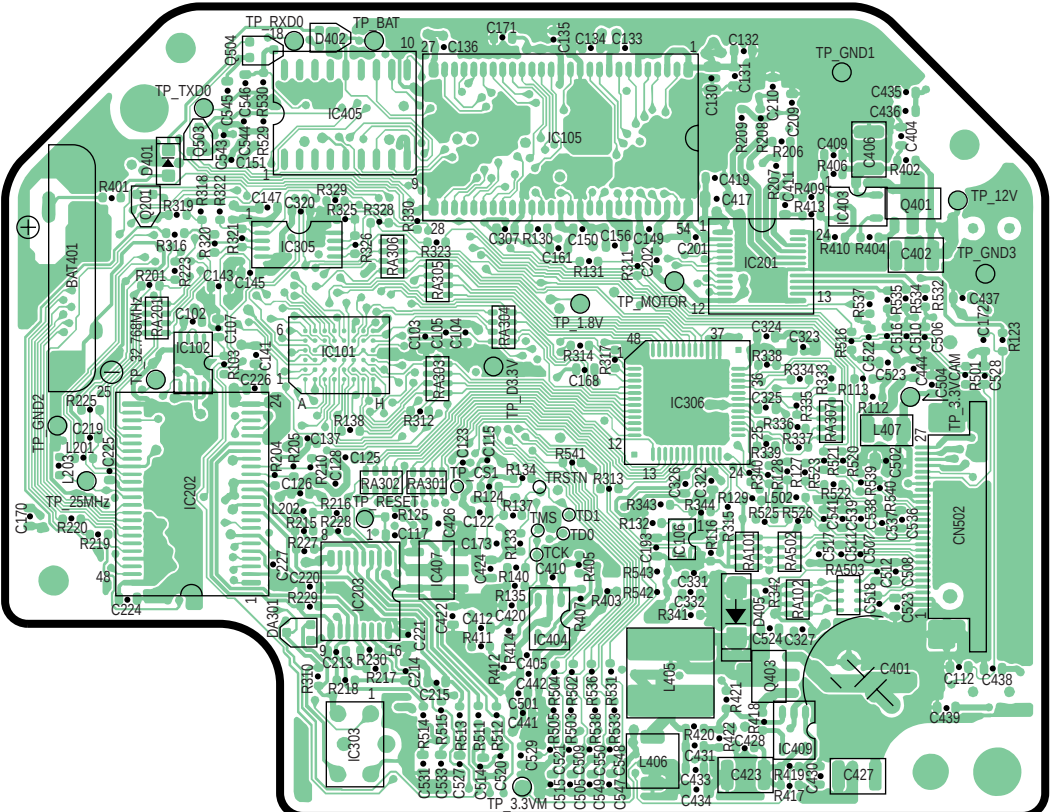

PSUP1464Z
PbF
11
12
1
2
SA618
TP_IOGND2
TP_DCIN
TP_EXMICAMP1
TP_EXMICAMP2
TP_BIMICAMP1
TP_MICGND
TP_+3.3V
TP_EXMICIN
TP_MICS
SA611
SA616
SA613
TP_LED3.3V
TP_LEDR
R619
R618
TP_LEDG
C606
TP_BIMICAMP2
TP_BIMICIN
R611
C631
C632
15
IC601
C632
C644
C639
R632
R629
R630
Q603
TP_12V
30
SA602
C601
C613
16
C618
R621
C629
C634
C627
R614
R627
C615
R623
C625
IC602
C623
SA612
SA610
R634
TP_RX-
TP_TX-
TP_RX+
TP_TX+
TP_IOGND1
SA614
SA615
SA617
A
BB-HCM331 I/O BOARD



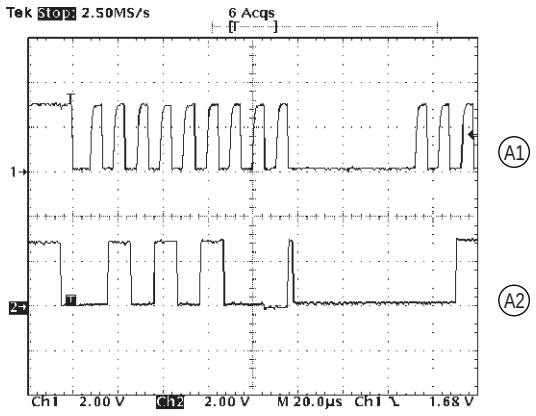

BB-HCM331 I/O BOARD




BB-HCM331 MAIN BOARD

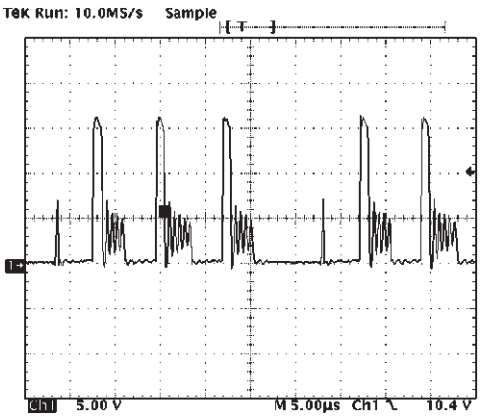



BB-HCM331 MAIN BOARD

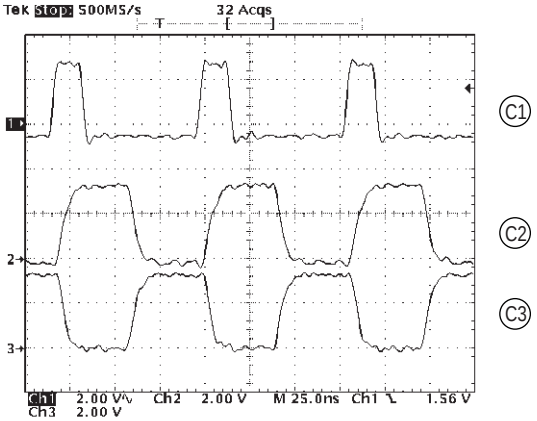



A1

A2



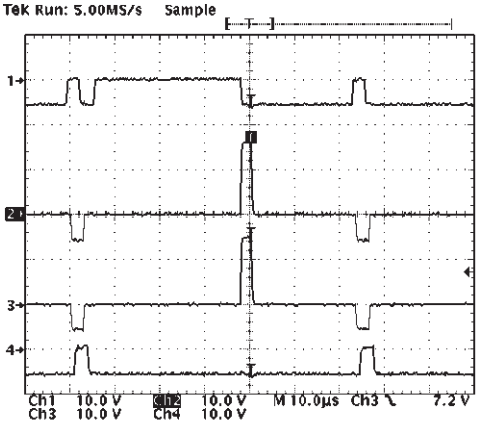

B




C1

C2

C3

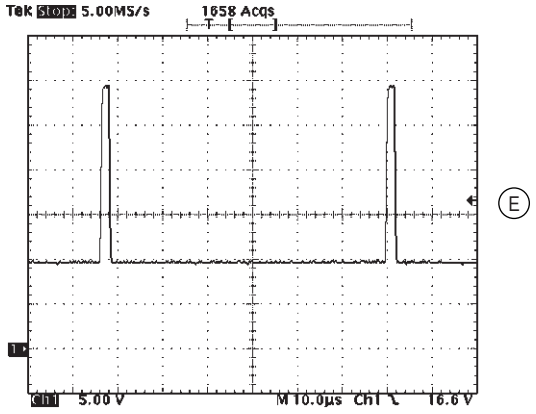



D1

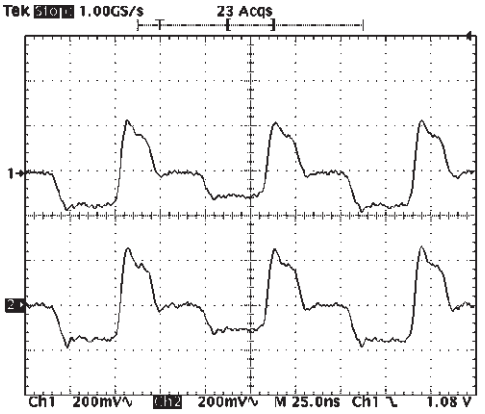
D2

D3

D4

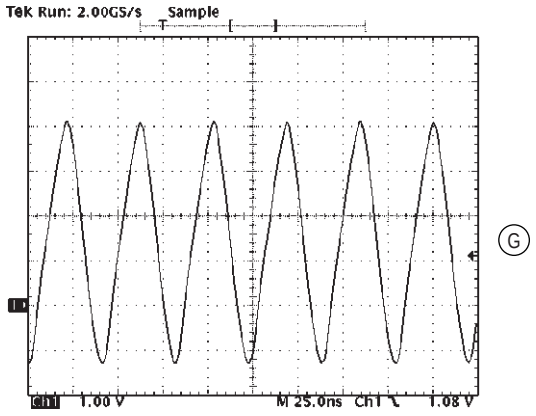



E

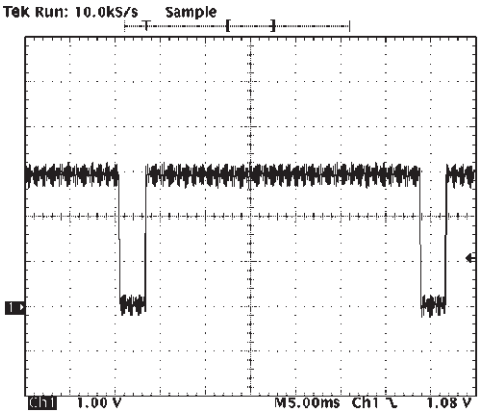



F1

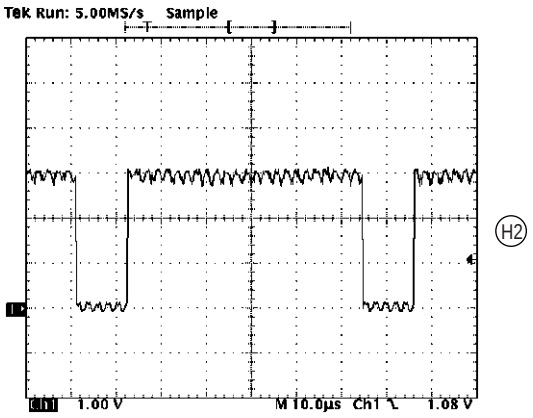
F2



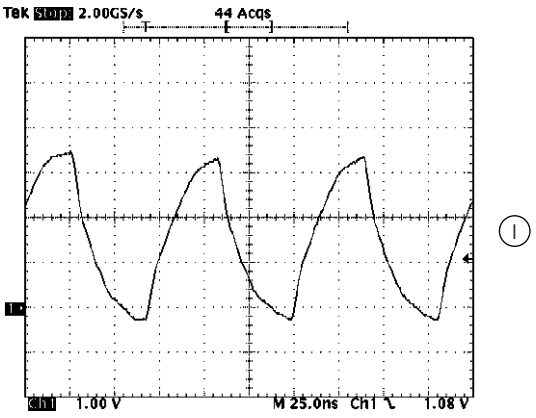

G



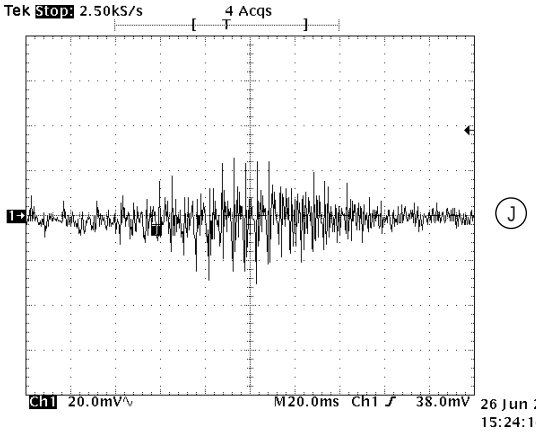

H1


Tek Run: 5.00MS/s Sample
Ch1 1.00 V
M 10.0µs Ch1 ∿ 1.08 V

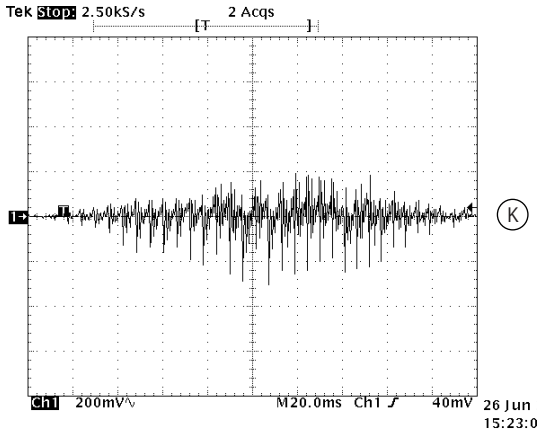
H2


Tek Stop: 2.00GS/s 44 Acqs
Ch1 1.00 V
M 25.0ns Ch1 ∿ 1.08 V

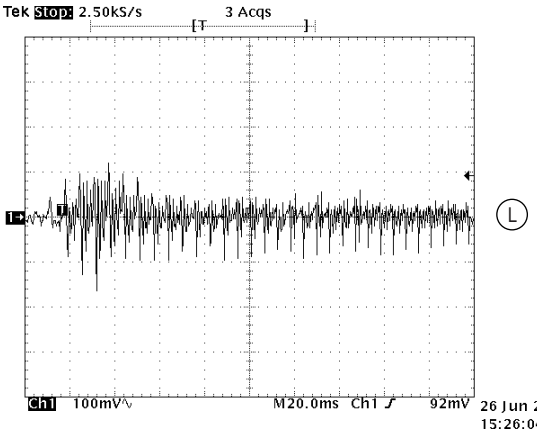
I


Tek Stop: 2.50kS/s 4 Acqs
Ch1 20.0mV∿
M20.0ms Ch1 ƒ 38.0mV
26 Jun 2004
15:24:14

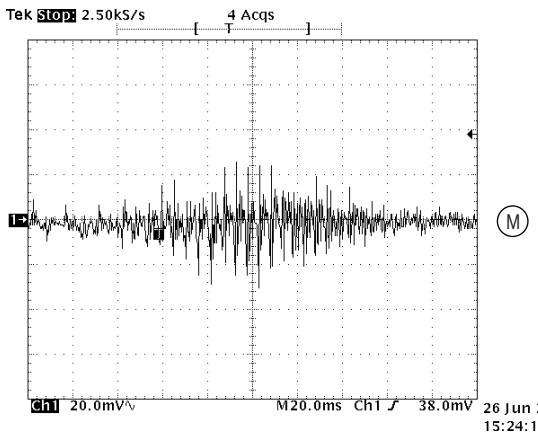
J


Tek Stop: 2.50kS/s 2 Acqs
Ch1 200mV∿
M20.0ms Ch1 ƒ 40mV
26 Jun 2004
15:23:06

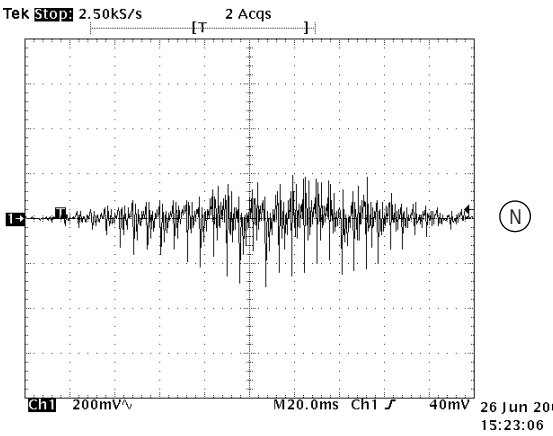
K


Tek Stop: 2.50kS/s 3 Acqs
Ch1 100mV∿
M20.0ms Ch1 ƒ 92mV
26 Jun 2004
15:26:04

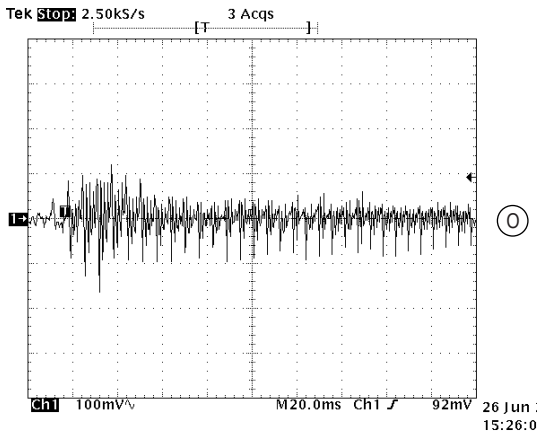
L


Tek Stop: 2.50kS/s 4 Acqs
Ch1 20.0mV∿
M20.0ms Ch1 ƒ 38.0mV
26 Jun 2004
15:24:14

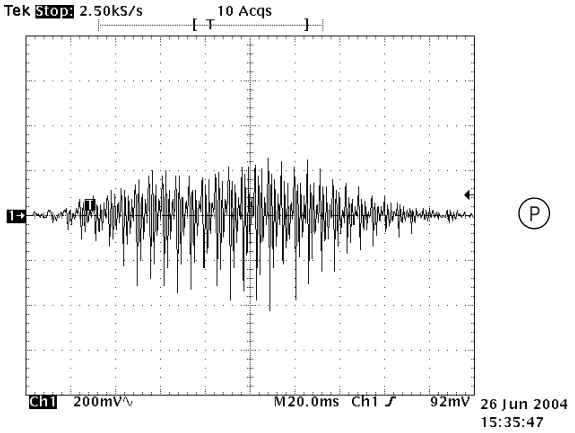
M


Tek Stop: 2.50kS/s 2 Acqs
Ch1 200mV∿
M20.0ms Ch1 ƒ 40mV
26 Jun 2004
15:23:06

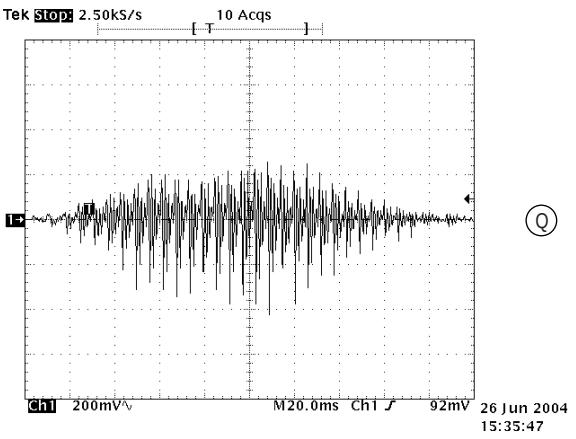
N


Tek Stop: 2.50kS/s 3 Acqs
Ch1 100mV∿
M20.0ms Ch1 ƒ 92mV
26 Jun 2004
15:26:04

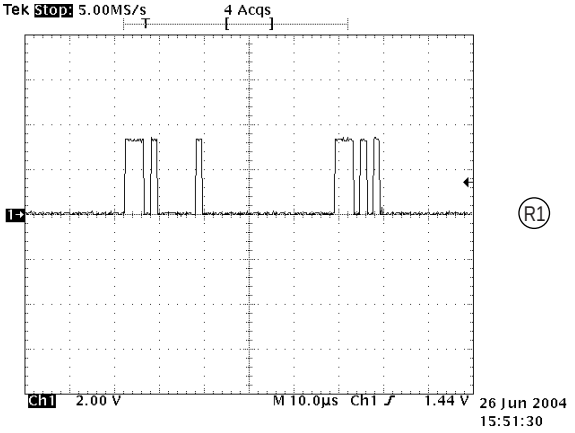
O



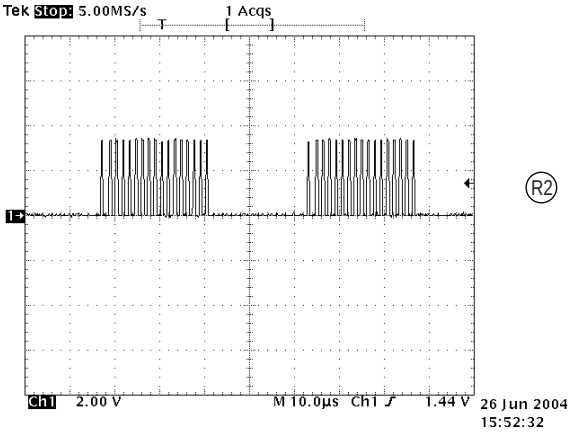

P



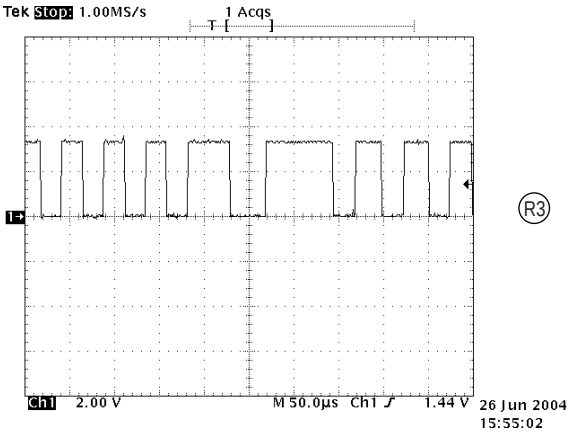

Q



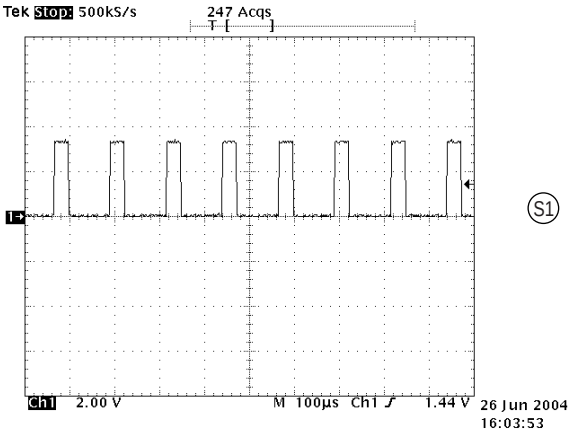

R1



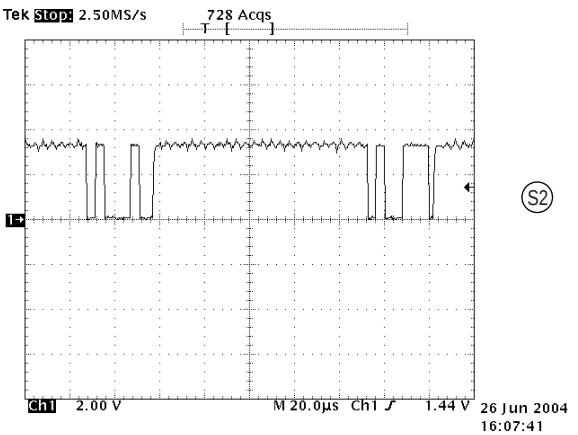

R2



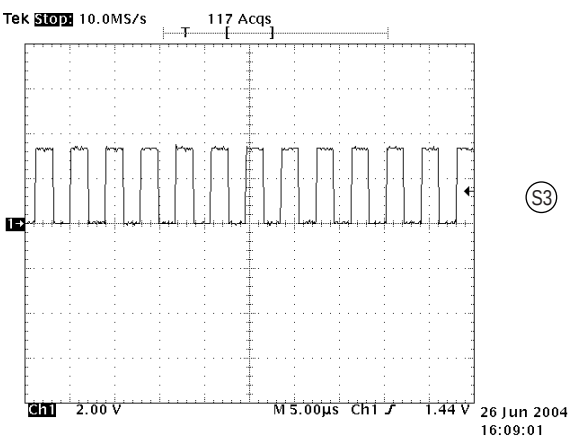

R3



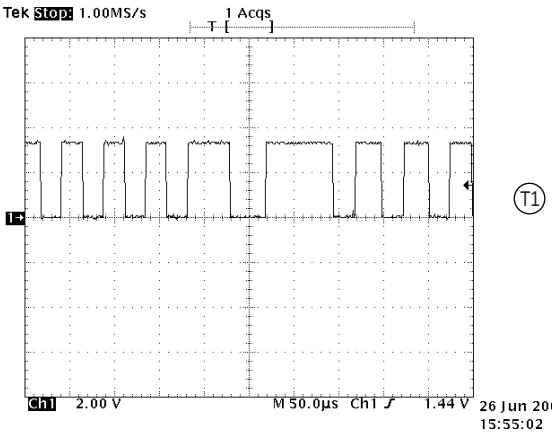

S1



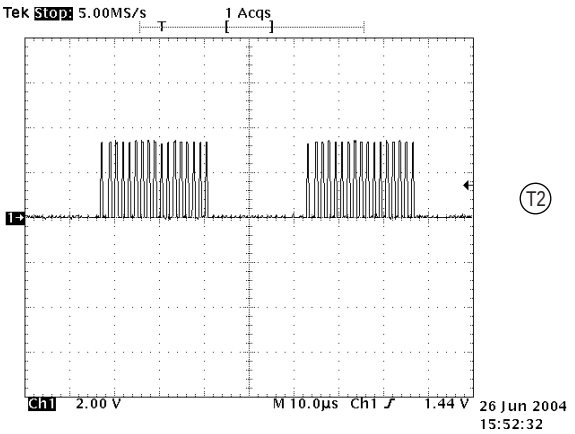

S2



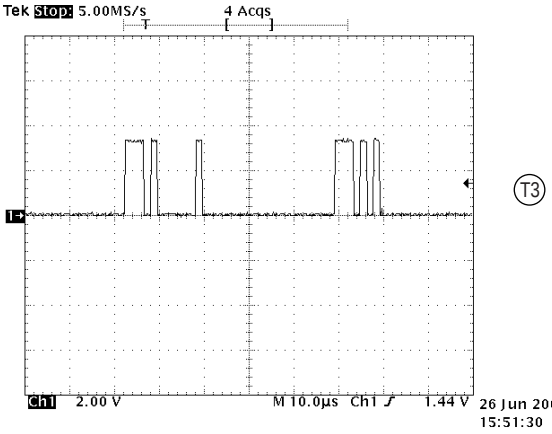

S3



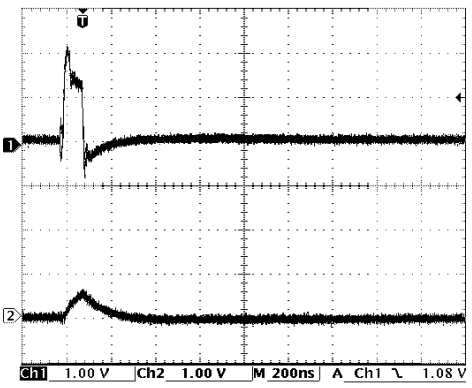

T1




T2



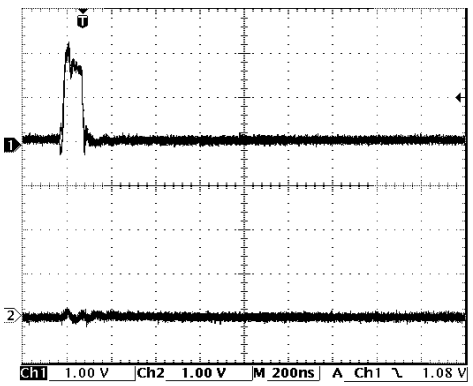

T3




U1

U2

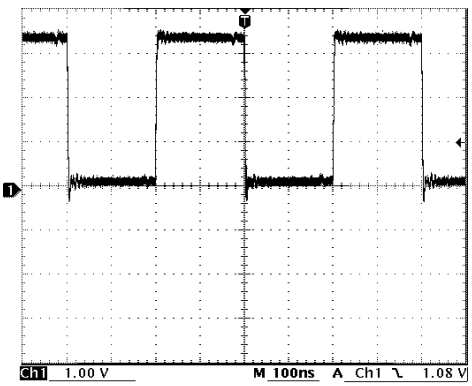
10Base Hub Connection (un-communicating)



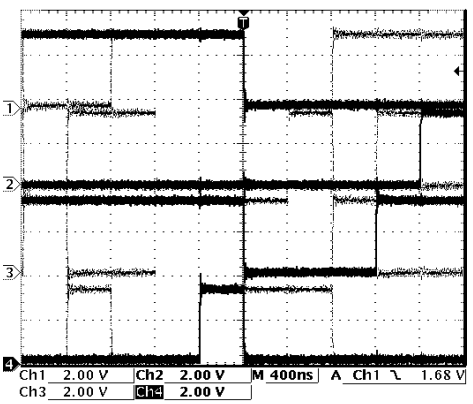

U3

U4

10Base Hub Connection (un-communicating)




U5



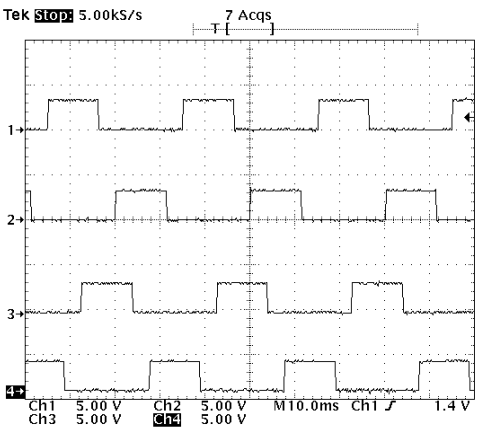

U6

U7

U8

U9

10Base Hub Connection (Communicating)

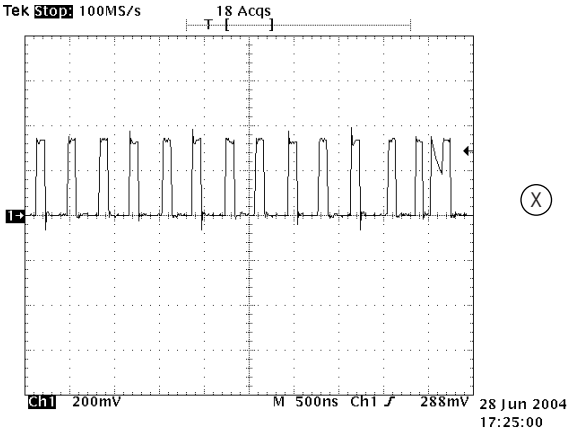



V1 W1

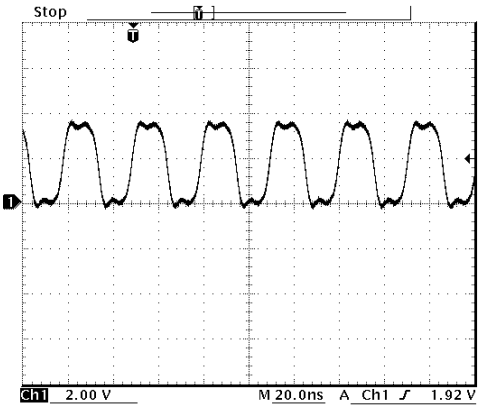
V2 W2

V3 W3

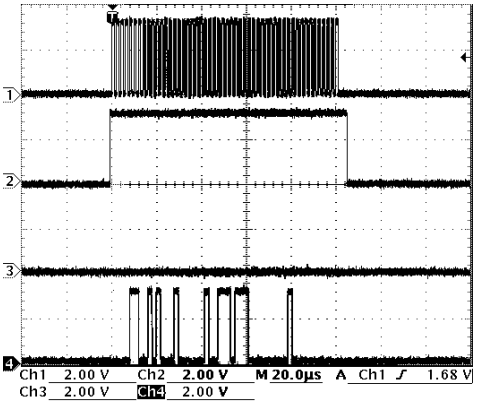
V4 W4


Tek Stop: 100MS/s
18 Acqs
Ch1 200mV
M 500ns Ch1 ƒ 288mV
28 Jun 2004
17:25:00

X


Stop
Ch1 2.00 V
M 20.0ns A Ch1 ƒ 1.92 V

X

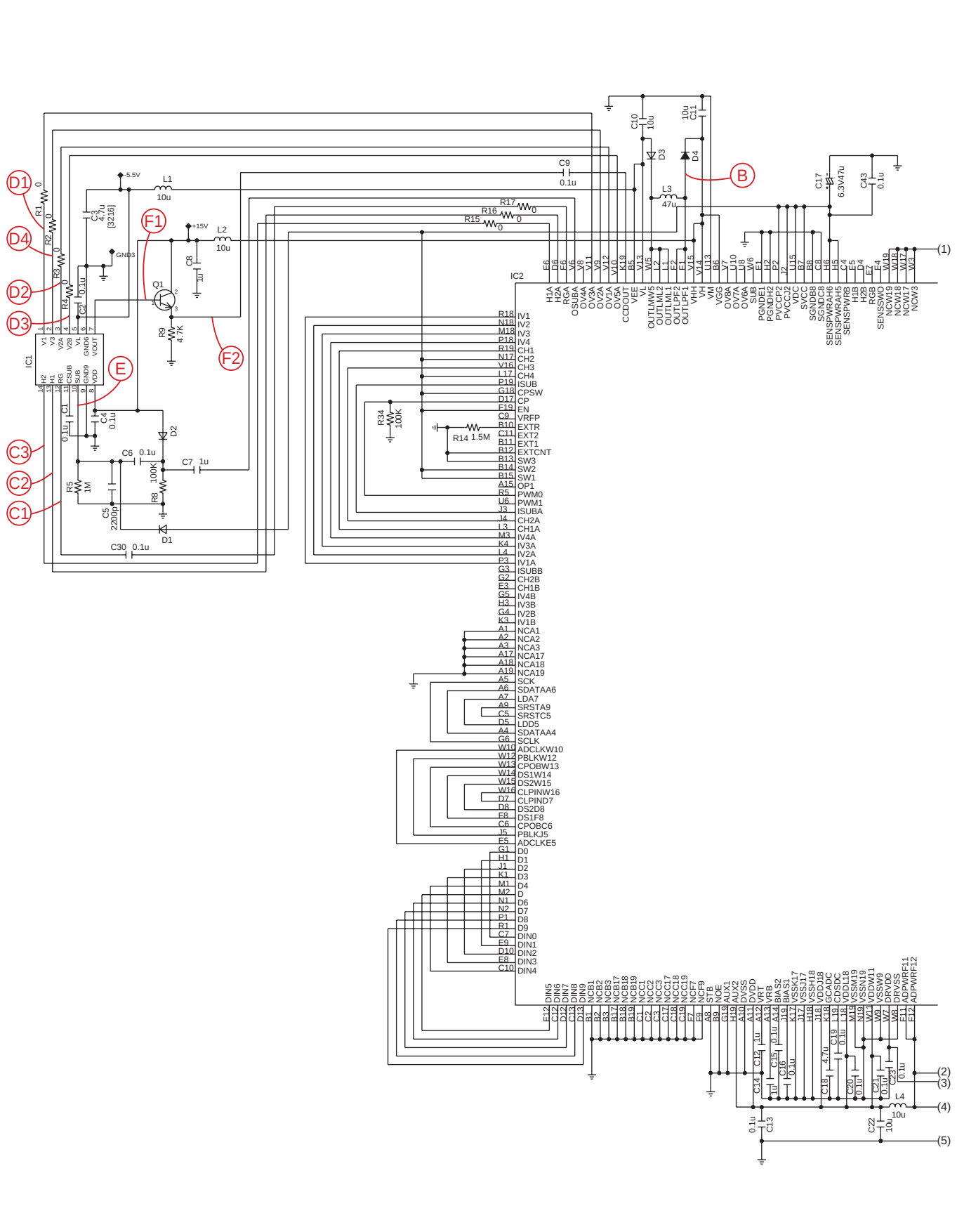

Ch1 2.00 V
Ch2 2.00 V
M 20.0µs
A Ch1 ƒ 1.68 V
Ch3 2.00 V
Ch4 2.00 V

Z2

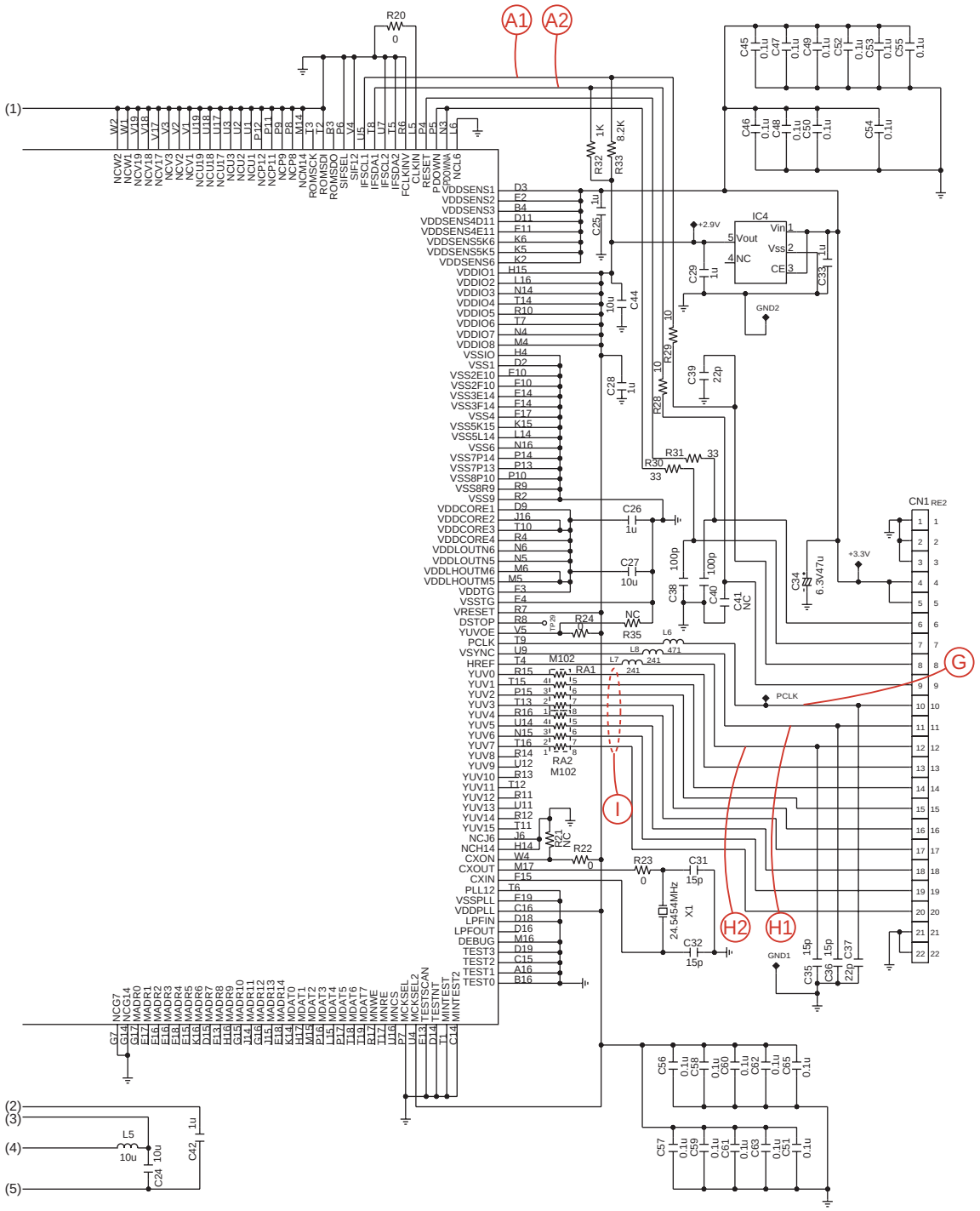
Z3

Z4

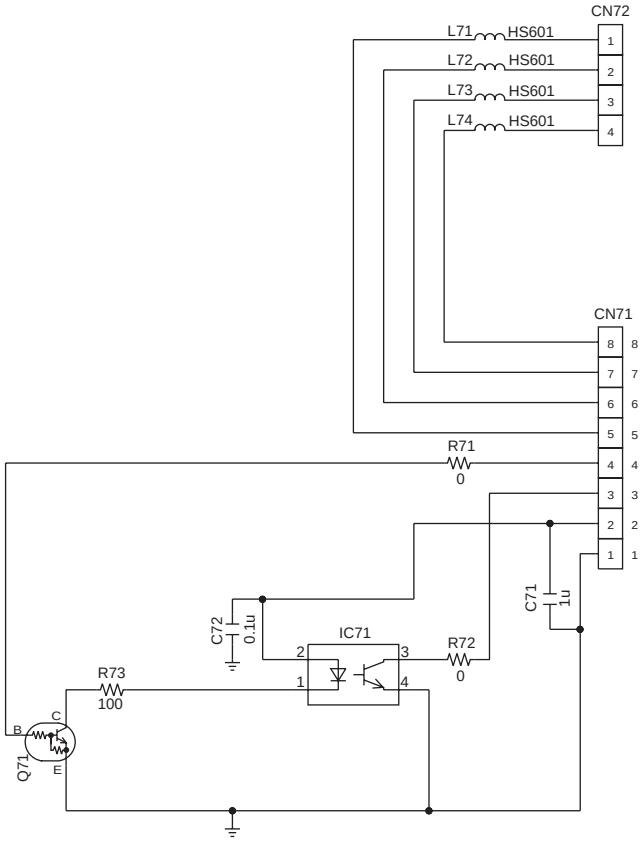
Z5

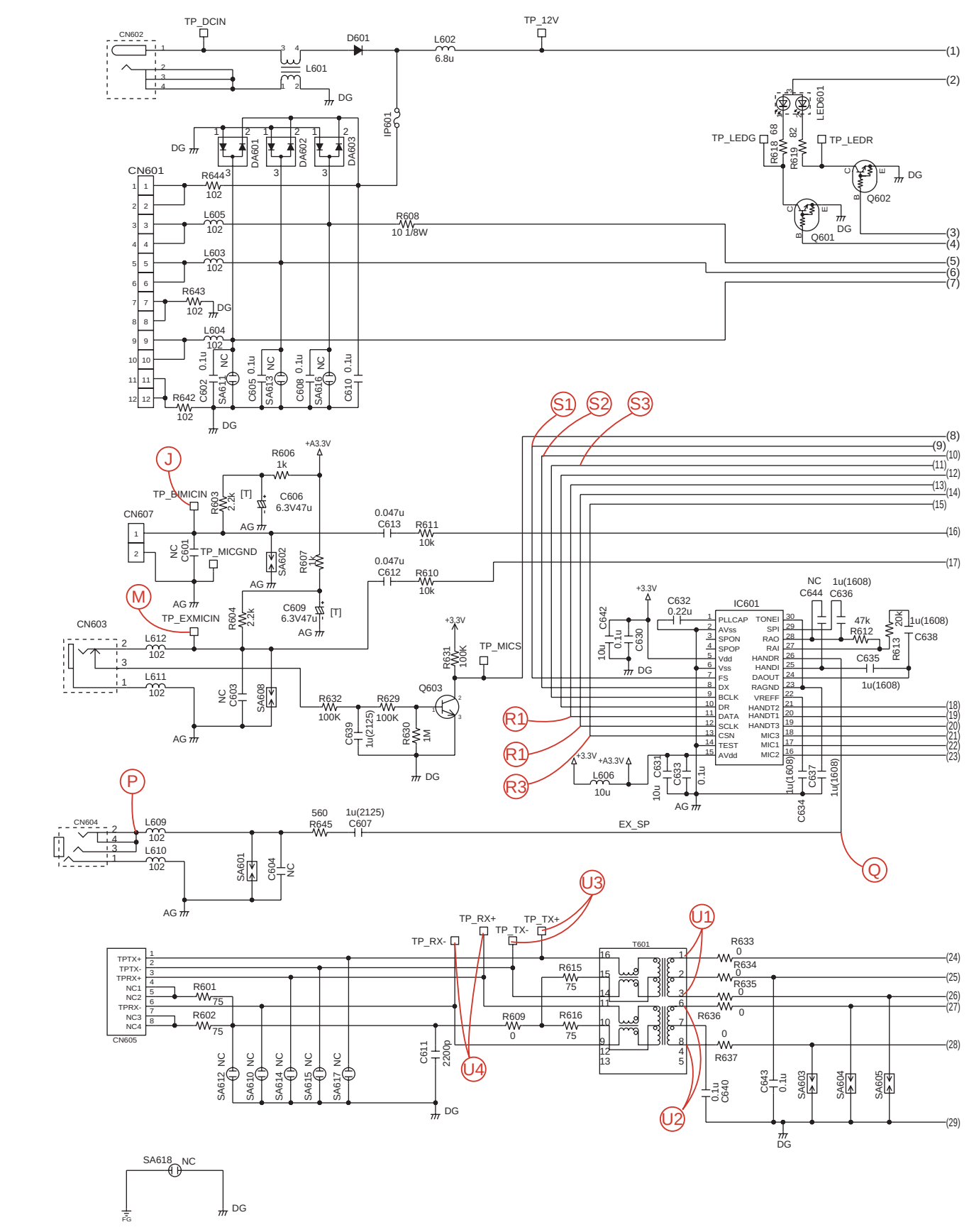


BB-HCM331 CAMERA BOARD (1/2)

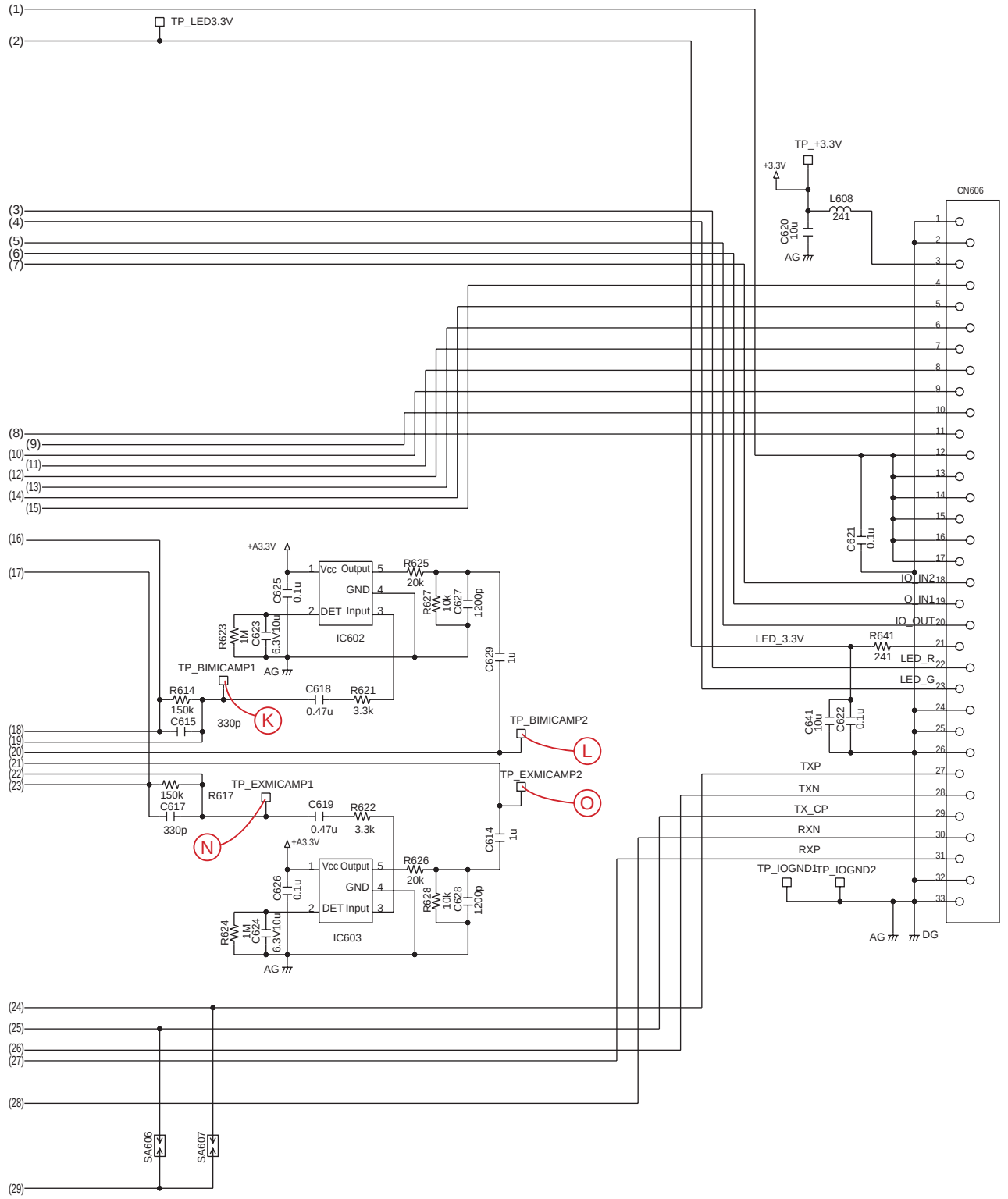


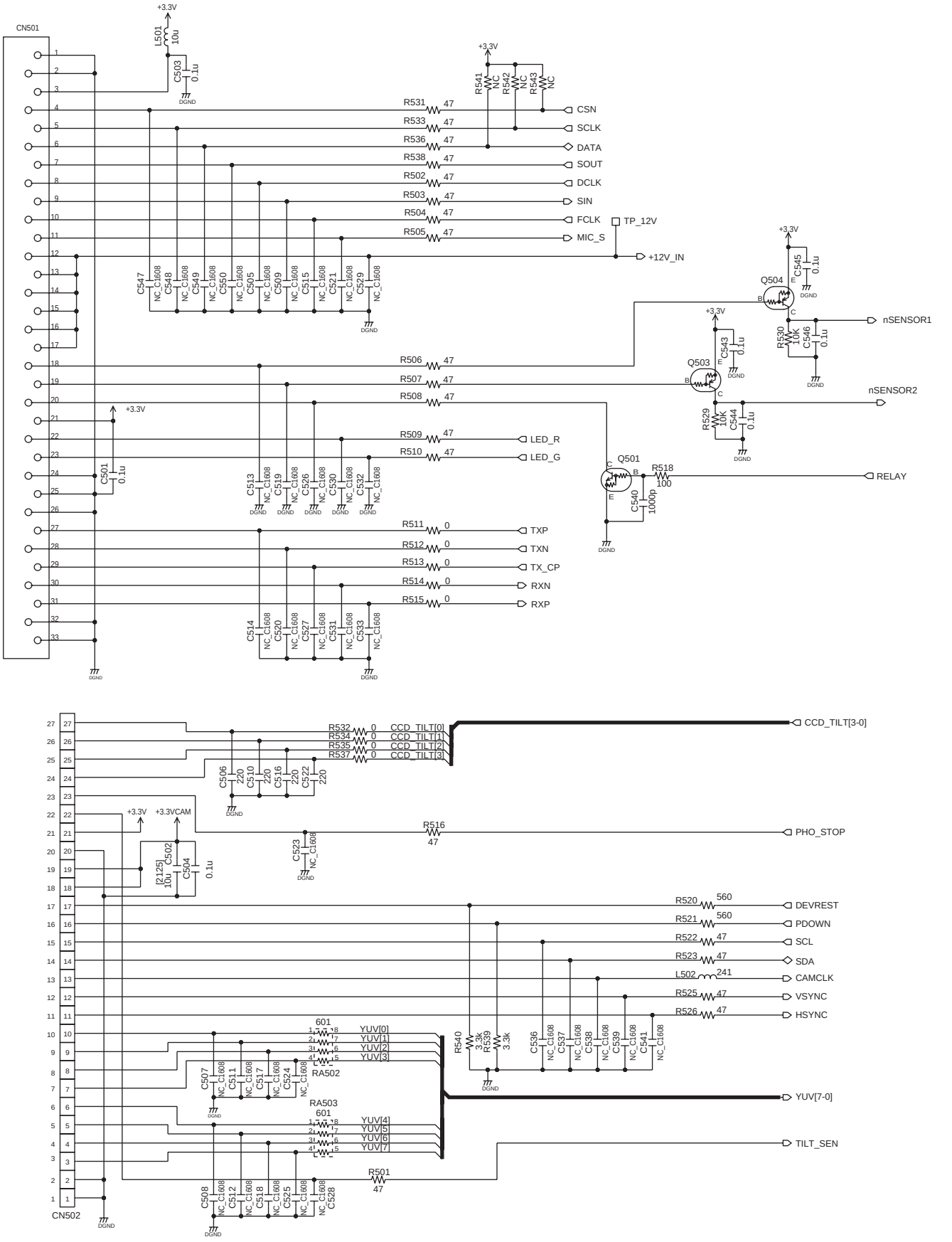

BB-HCM331 CAMERA BOARD (2/2)

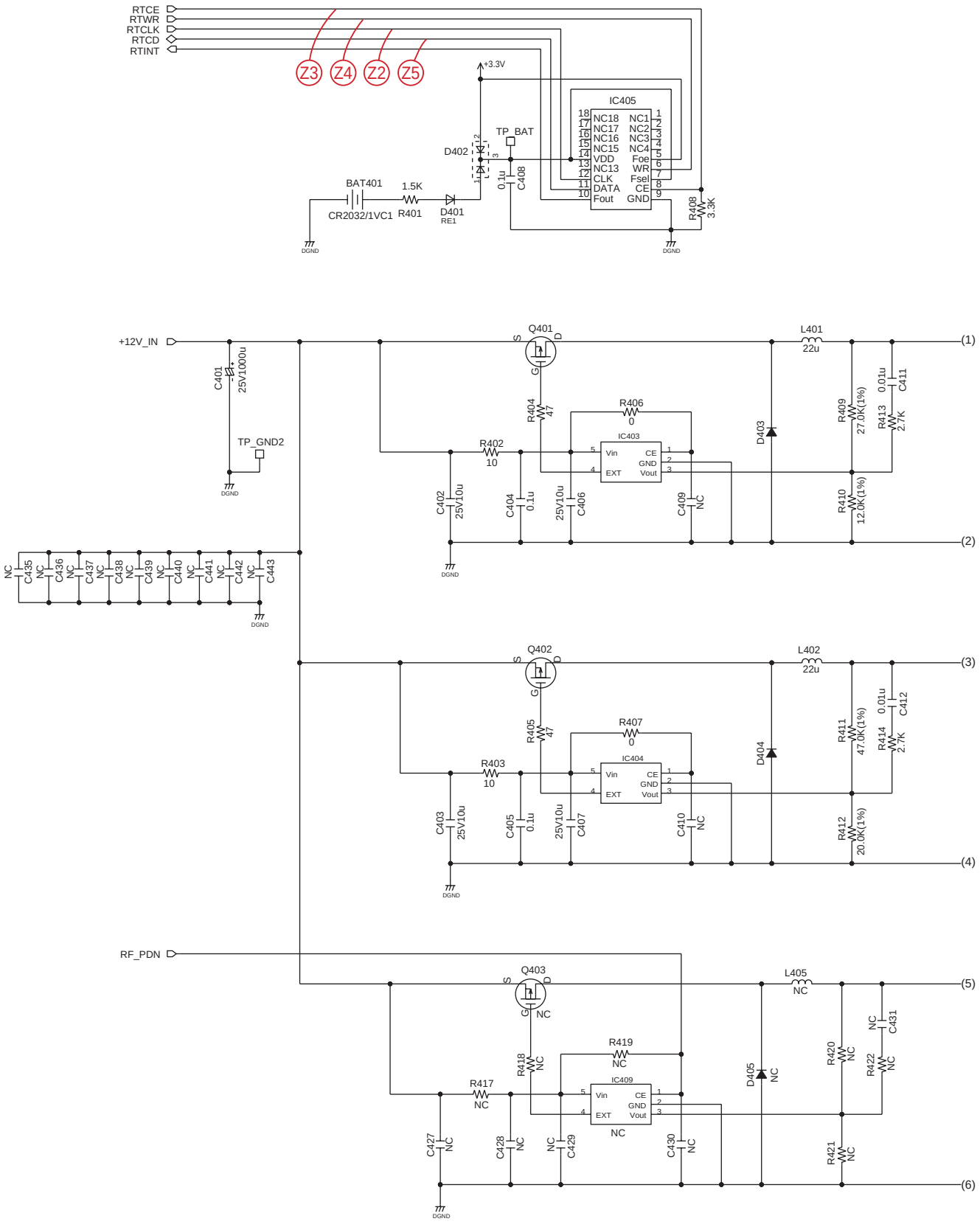

CN72
L71 HS601
L72 HS601
L73 HS601
L74 HS601
1
2
3
4
CN71
8 8
7 7
6 6
5 5
4 4
3 3
2 2
1 1
R71
0
C71
1u
C72
0.1u
IC71
2
3
1
4
R72
0
R73
100
B
C
E
Q71



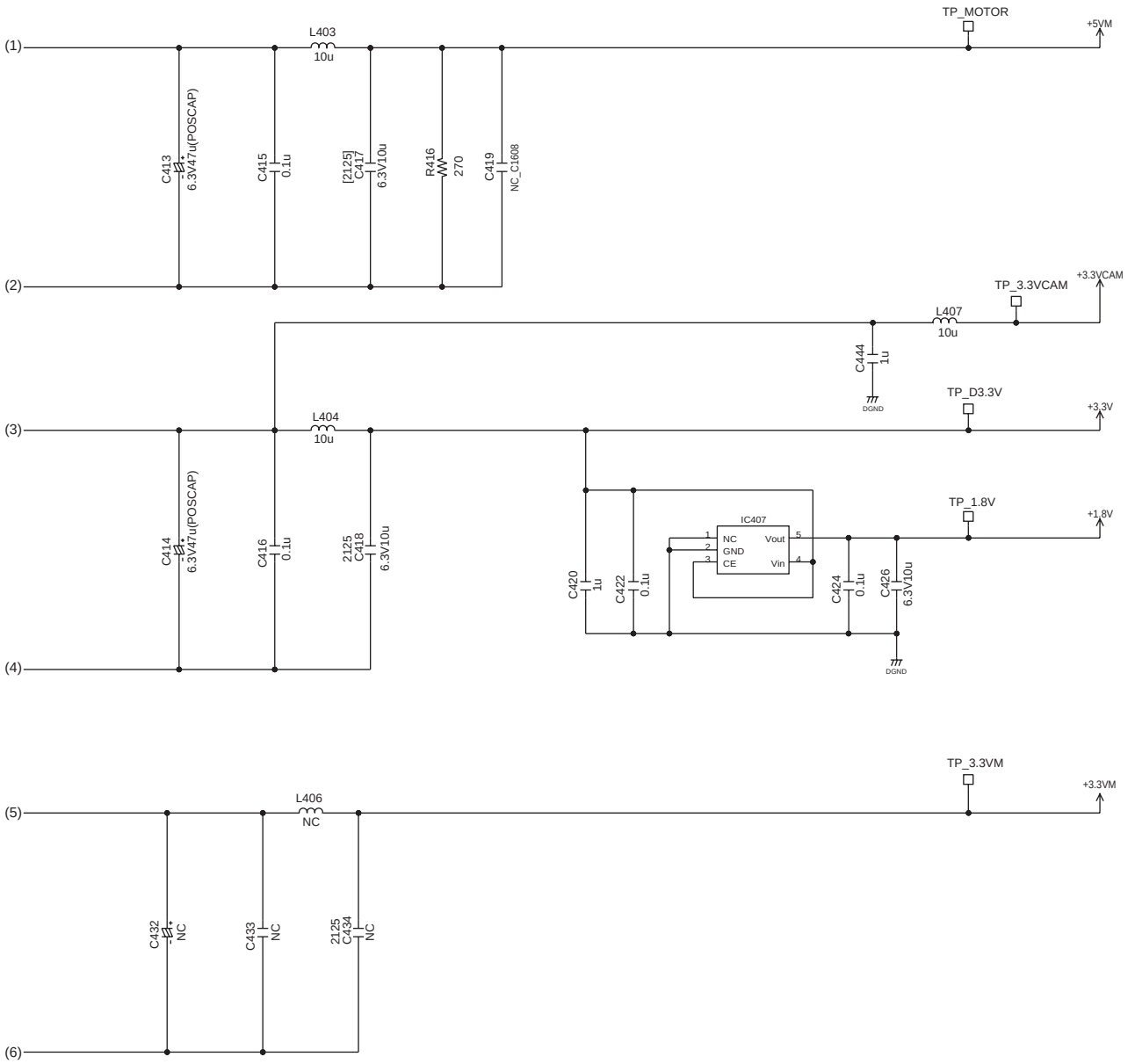

BB-HCM331 I/O BOARD (1/2)

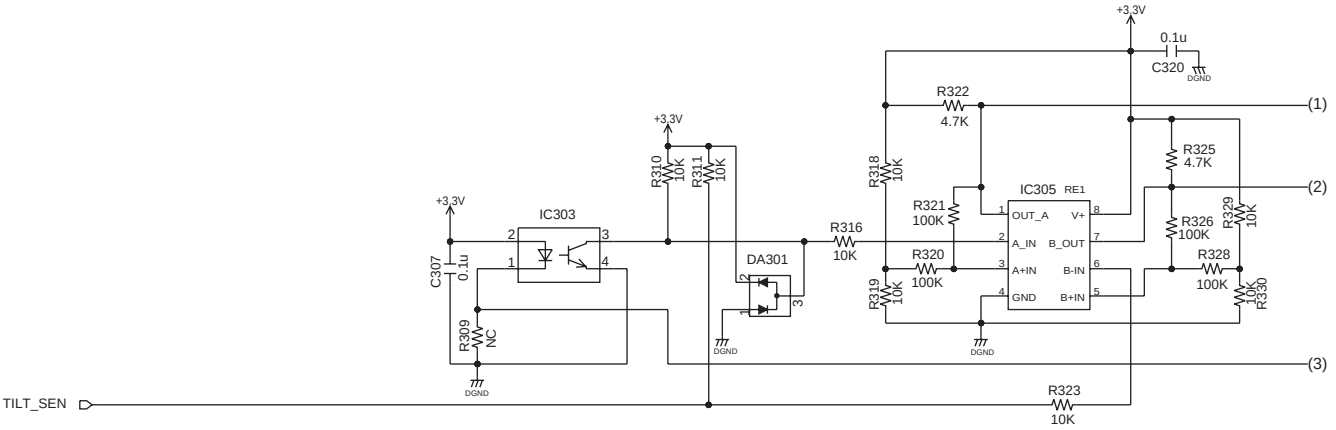

TP_LED3.3V
TP_+3.3V
+3.3V
L608
241
C620
10u
AG
CN606
C621
0.1u
IO_IN2
O_IN1
IO_OUT
LED_3.3V
R641
241
LED_R
LED_G
C641
10u
C622
0.1u
TXP
TXN
TX_CP
RXN
RXP
TP_IOGND1
TP_IOGND2
AG
DG
+A3.3V
Vcc
Output
GND
DET
Input
IC602
R625
20k
R627
10k
C627
1200p
C625
0.1u
R623
1M
C623
6.3V10u
C629
1u
TP_BIMICAMP1
TP_BIMICAMP2
R614
150k
C615
330p
C618
0.47u
R621
3.3k
K
L
TP_EXMICAMP1
TP_EXMICAMP2
R617
150k
C617
330p
C619
0.47u
R622
3.3k
N
O
C614
1u
IC603
R626
20k
R628
10k
C628
1200p
C626
0.1u
R624
1M
C624
6.3V10u
SA606
SA607

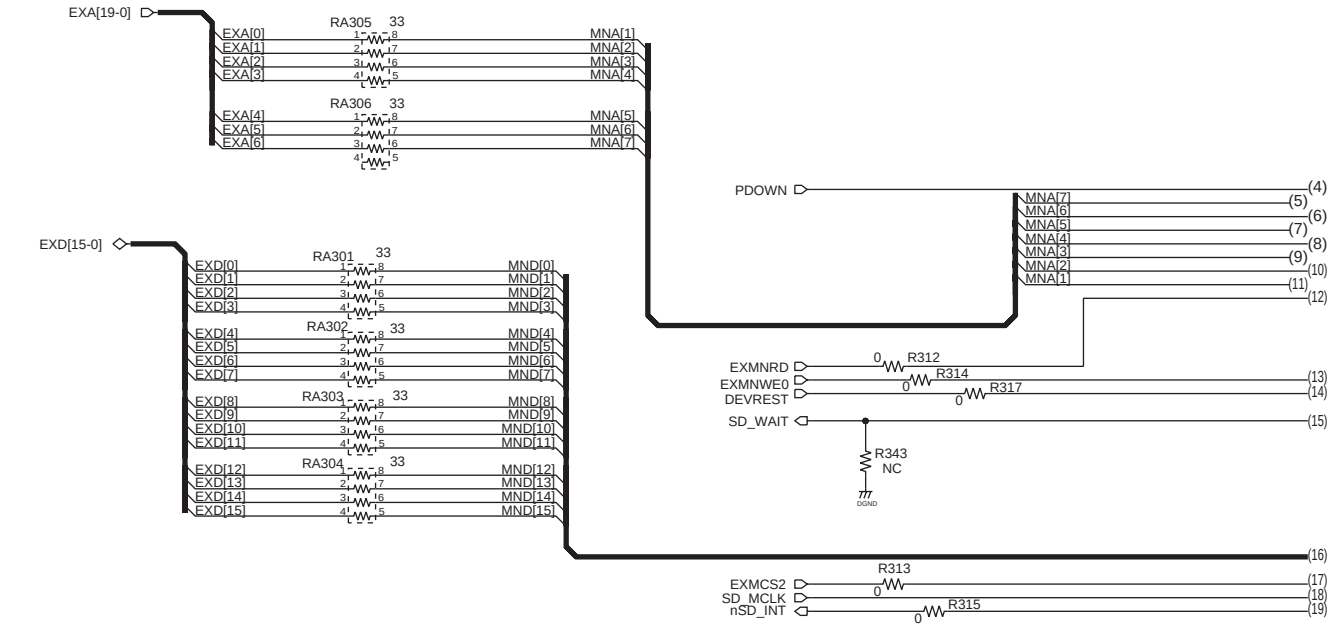

CN501
CN502
+3.3V
+3.3VCAM
DGND
L501 10u
C503 0.1u
R531 47
R533 47
R536 47
R538 47
R502 47
R503 47
R504 47
R505 47
CSN
SCLK
DATA
SOUT
DCLK
SIN
FCLK
MIC_S
TP_12V
+12V_IN
R541 NC
R542 NC
R543 NC
C547 NC_C1608
C548 NC_C1608
C549 NC_C1608
C550 NC_C1608
C505 NC_C1608
C509 NC_C1608
C515 NC_C1608
C521 NC_C1608
C529 NC_C1608
Q504
C545 0.1u
R530 10K
C546 0.1u
nSENSOR1
Q503
C543 0.1u
R529 10K
C544 0.1u
nSENSOR2
R506 47
R507 47
R508 47
R509 47
R510 47
LED_R
LED_G
C501 0.1u
C513 NC_C1608
C519 NC_C1608
C526 NC_C1608
C530 NC_C1608
C532 NC_C1608
Q501
R518 100
C540 1000p
RELAY
R511 0
R512 0
R513 0
R514 0
R515 0
TXP
TXN
TX_CP
RXN
RXP
C514 NC_C1608
C520 NC_C1608
C527 NC_C1608
C531 NC_C1608
C533 NC_C1608
R532 0 CCD_TILT[0]
R534 0 CCD_TILT[1]
R535 0 CCD_TILT[2]
R537 0 CCD_TILT[3]
CCD_TILT[3-0]
C506 220
C510 220
C516 220
C522 220
R516 47
PHO_STOP
C523 NC_C1608
[2125] C502 10u
C504 0.1u
R520 560
R521 560
R522 47
R523 47
L502 241
R525 47
R526 47
DEVREST
PDOWN
SCL
SDA
CAMCLK
VSYNC
HSYNC
601
YUV[0]
YUV[1]
YUV[2]
YUV[3]
RA502
RA503
YUV[4]
YUV[5]
YUV[6]
YUV[7]
YUV[7-0]
R540 3.3k
R538 3.3k
R539 3.3k
C536 NC_C1608
C537 NC_C1608
C538 NC_C1608
C539 NC_C1608
C541 NC_C1608
C507 NC_C1608
C511 NC_C1608
C517 NC_C1608
C524 NC_C1608
C508 NC_C1608
C512 NC_C1608
C518 NC_C1608
C525 NC_C1608
C528 NC_C1608
R501 47
TILT_SEN

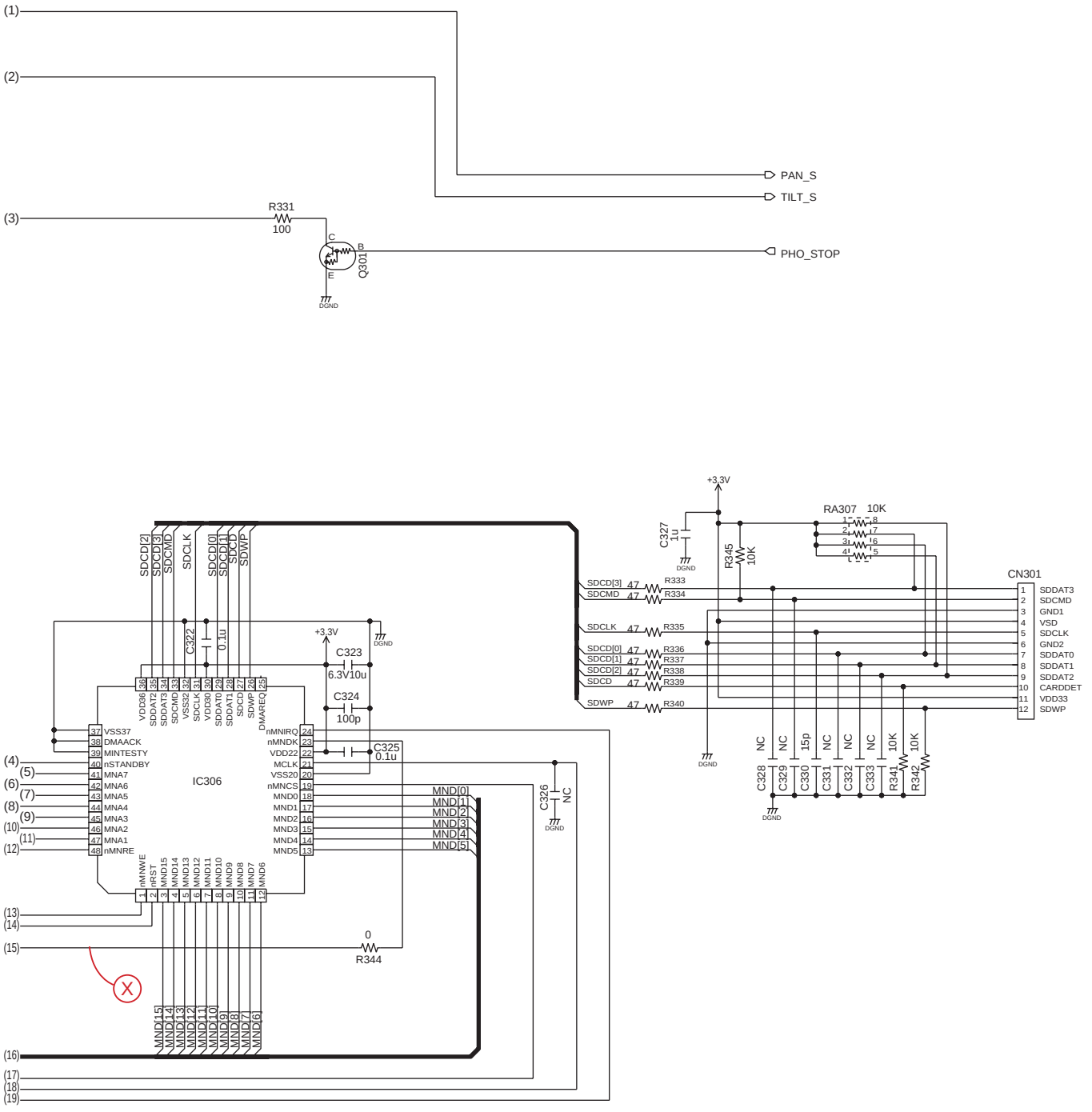


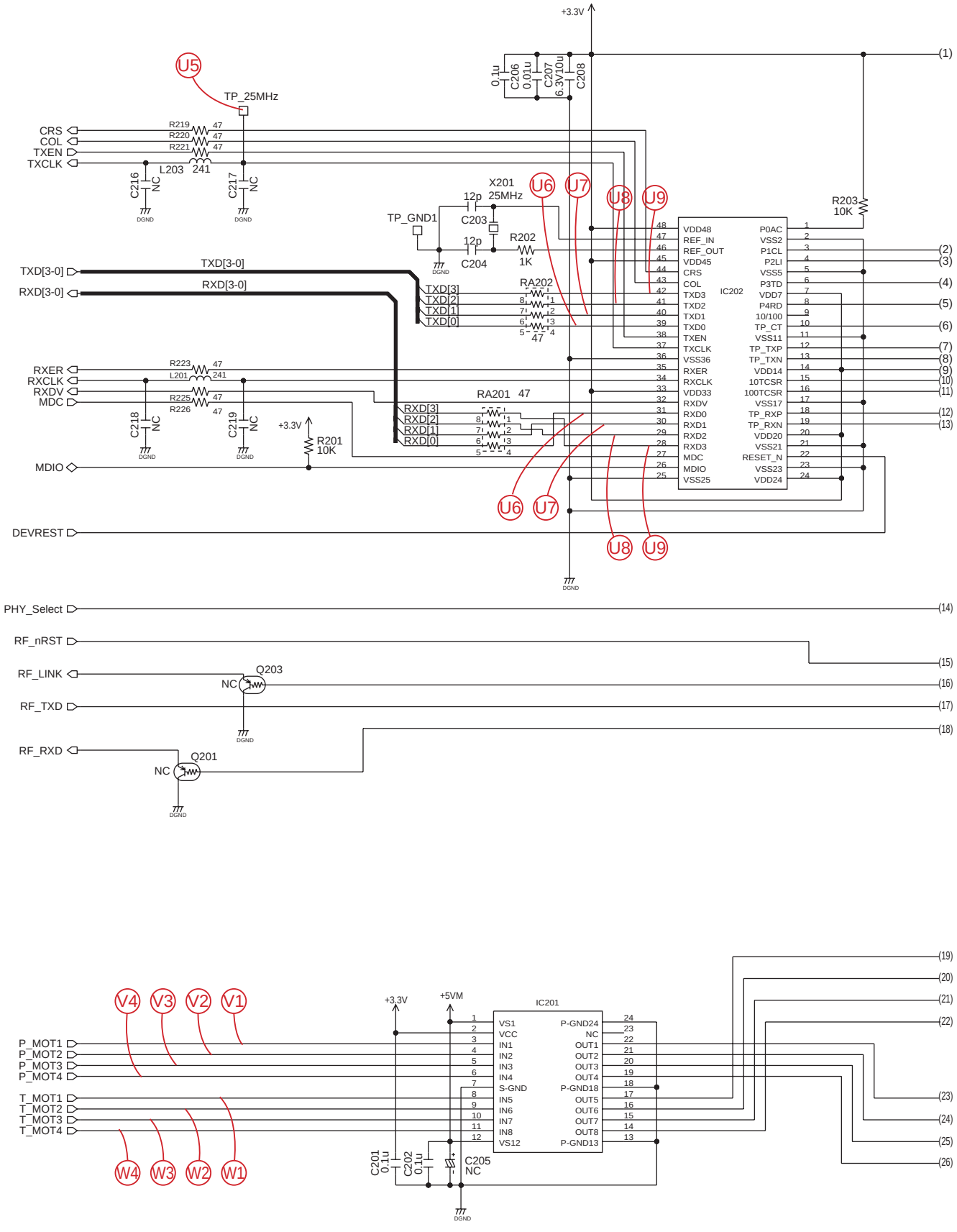

BB-HCM331 MAIN BOARD No.4 (1/2)

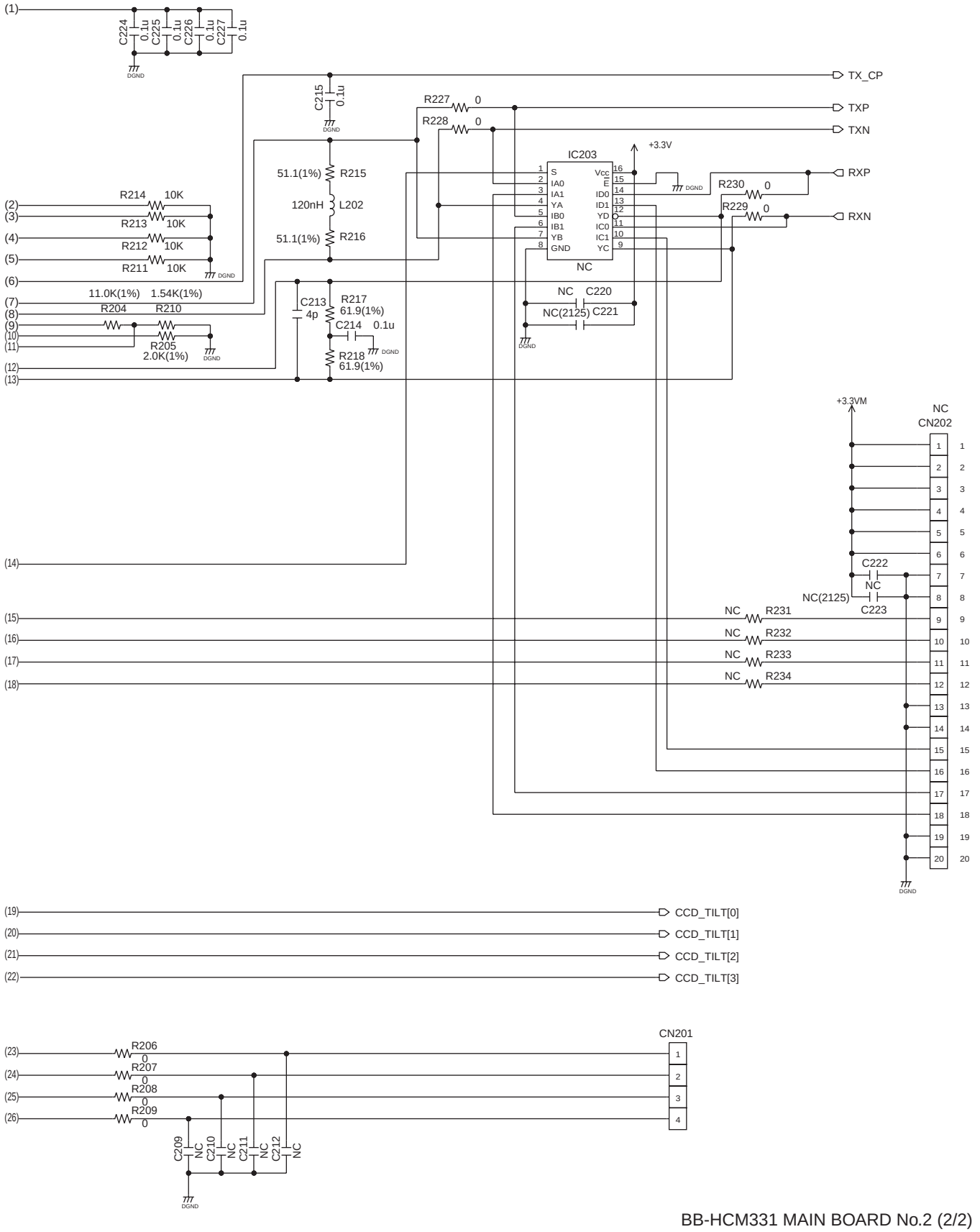

TP_MOTOR
+5VM
L403
10u
C413
6.3V47u(POSCAP)
C415
0.1u
[2125]
C417
6.3V10u
R416
270
C419
NC_C1608
TP_3.3VCAM
+3.3VCAM
L407
10u
C444
1u
DGND
TP_D3.3V
+3.3V
L404
10u
C414
6.3V47u(POSCAP)
C416
0.1u
2125
C418
6.3V10u
IC407
1 NC
2 GND
3 CE
5 Vout
4 Vin
TP_1.8V
+1.8V
C420
1u
C422
0.1u
C424
0.1u
C426
6.3V10u
DGND
TP_3.3VM
+3.3VM
L406
NC
C432
NC
C433
NC
2125
C434
NC
(1)
(2)
(3)
(4)
(5)
(6)


+3.3V
0.1u
C320
DGND
R322
4.7K
(1)
(2)
(3)
R325
4.7K
IC305
RE1
OUT_A
V+
A_IN
B_OUT
A+IN
B-IN
GND
B+IN
R321
100K
R320
100K
R319
10K
R318
10K
R326
100K
R328
100K
R329
10K
R330
10K
R316
10K
R310
10K
R311
10K
IC303
DA301
C307
0.1u
R309
NC
TILT_SEN
R323
10K

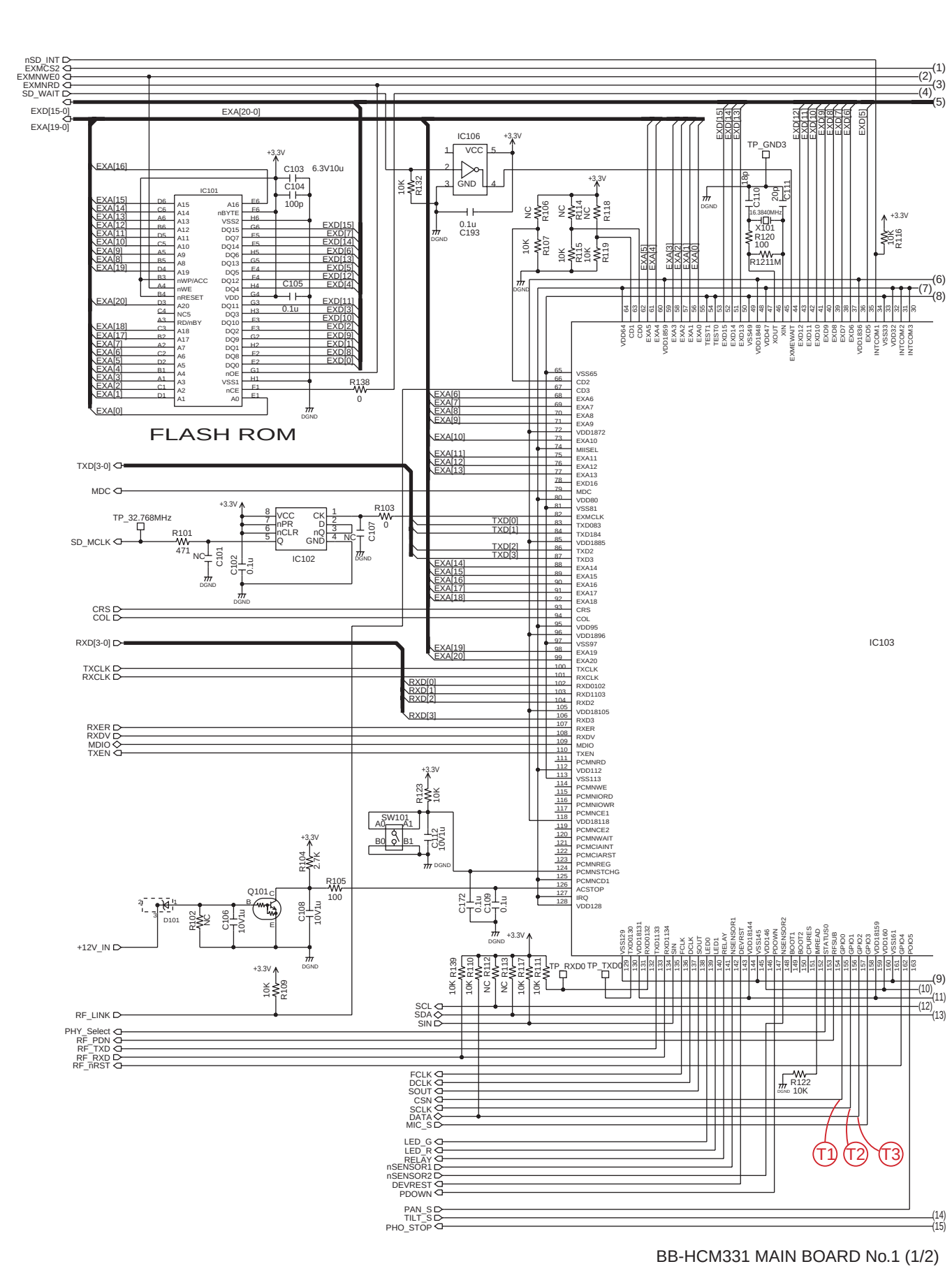

EXA[19-0]
RA305
RA306
33
EXA[0]
EXA[1]
EXA[2]
EXA[3]
EXA[4]
EXA[5]
EXA[6]
MNA[1]
MNA[2]
MNA[3]
MNA[4]
MNA[5]
MNA[6]
MNA[7]
PDOWN
(4)
(5)
(6)
(7)
(8)
(9)
(10)
(11)
(12)
EXD[15-0]
RA301
RA302
RA303
RA304
EXD[0]
EXD[1]
EXD[2]
EXD[3]
EXD[4]
EXD[5]
EXD[6]
EXD[7]
EXD[8]
EXD[9]
EXD[10]
EXD[11]
EXD[12]
EXD[13]
EXD[14]
EXD[15]
MND[0]
MND[1]
MND[2]
MND[3]
MND[4]
MND[5]
MND[6]
MND[7]
MND[8]
MND[9]
MND[10]
MND[11]
MND[12]
MND[13]
MND[14]
MND[15]
EXMNRD
EXMNWE0
DEVREST
R312
R314
R317
0
(13)
(14)
SD_WAIT
(15)
R343
NC
DGND
(16)
R313
EXMCS2
SD_MCLK
nSD_INT
R315
(17)
(18)
(19)


(1)
(2)
(3)
PAN_S
TILT_S
PHO_STOP
R331
100
Q301
DGND
+3.3V
C327
1u
R345
10K
RA307 10K
CN301
SDCD[3]
SDCMD
SDCLK
SDCD[0]
SDCD[1]
SDCD[2]
SDCD
SDWP
R333
R334
R335
R336
R337
R338
R339
R340
47
SDDAT3
SDCMD
GND1
VSD
SDCLK
GND2
SDDAT0
SDDAT1
SDDAT2
CARDDET
VDD33
SDWP
C322
0.1u
C323
6.3V10u
C324
100p
C325
0.1u
C326
NC
IC306
VSS37
DMAACK
MINTESTY
nSTANDBY
MNA7
MNA6
MNA5
MNA4
MNA3
MNA2
MNA1
nMNRE
nMNIRQ
nMNDK
VDD22
MCLK
VSS20
nMNCS
MND0
MND1
MND2
MND3
MND4
MND5
MND[0]
MND[1]
MND[2]
MND[3]
MND[4]
MND[5]
R344
0
C328
C329
C330
C331
C332
C333
R341
R342
NC
15p
10K
MND[15]
MND[14]
MND[13]
MND[12]
MND[11]
MND[10]
MND[9]
MND[8]
MND[7]
MND[6]

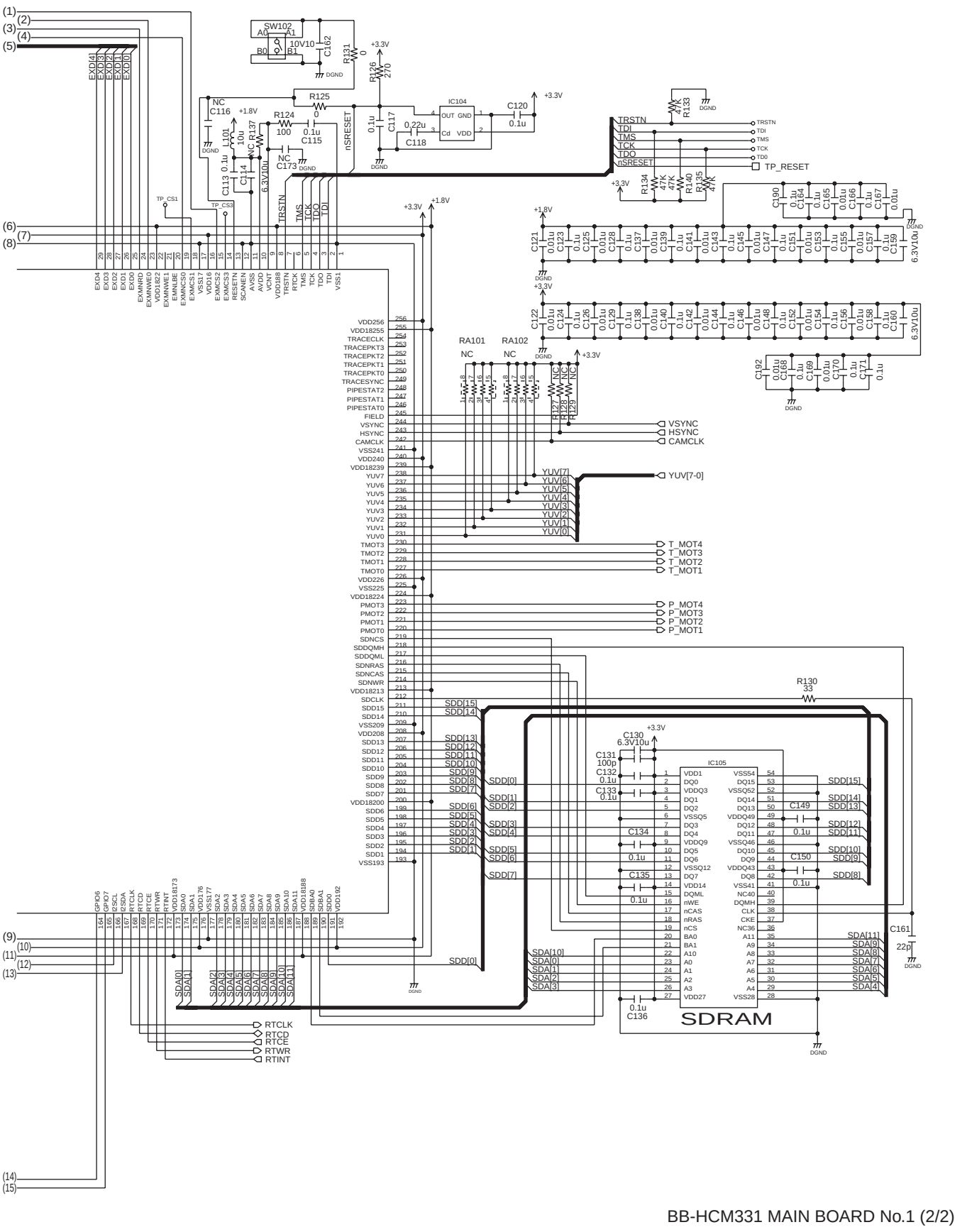

+3.3V
U5
TP_25MHz
CRS
COL
TXEN
TXCLK
R219 47
R220 47
R221 47
L203 241
C216 NC
C217 NC
DGND
0.1u C206
0.01u C207
6.3V10u C208
X201 25MHz
12p C203
12p C204
TP_GND1
R202 1K
R203 10K
U6 U7 U8 U9
TXD[3-0]
RXD[3-0]
RA202 47
TXD[3]
TXD[2]
TXD[1]
TXD[0]
IC202
VDD48 REF_IN REF_OUT VDD45 CRS COL TXD3 TXD2 TXD1 TXD0 TXEN TXCLK VSS36 RXER RXCLK VDD33 RXDV RXD0 RXD1 RXD2 RXD3 MDC MDIO VSS25
P0AC VSS2 P1CL P2LI VSS5 P3TD VDD7 P4RD 10/100 TP_CT VSS11 TP_TXP TP_TXN VDD14 10TCSR 100TCSR VSS17 TP_RXP TP_RXN VDD20 VSS21 RESET_N VSS23 VDD24
RXER
RXCLK
RXDV
MDC
R223 47
L201 241
R225 47
R226 47
C218 NC
C219 NC
R201 10K
RA201 47
RXD[3]
RXD[2]
RXD[1]
RXD[0]
MDIO
DEVREST
PHY_Select
RF_nRST
RF_LINK
RF_TXD
RF_RXD
Q203 NC
Q201 NC
V4 V3 V2 V1
W4 W3 W2 W1
P_MOT1
P_MOT2
P_MOT3
P_MOT4
T_MOT1
T_MOT2
T_MOT3
T_MOT4
+5VM
IC201
VS1 VCC IN1 IN2 IN3 IN4 S-GND IN5 IN6 IN7 IN8 VS12
P-GND24 NC OUT1 OUT2 OUT3 OUT4 P-GND18 OUT5 OUT6 OUT7 OUT8 P-GND13
C201 0.1u
C202 0.1u
C205 NC

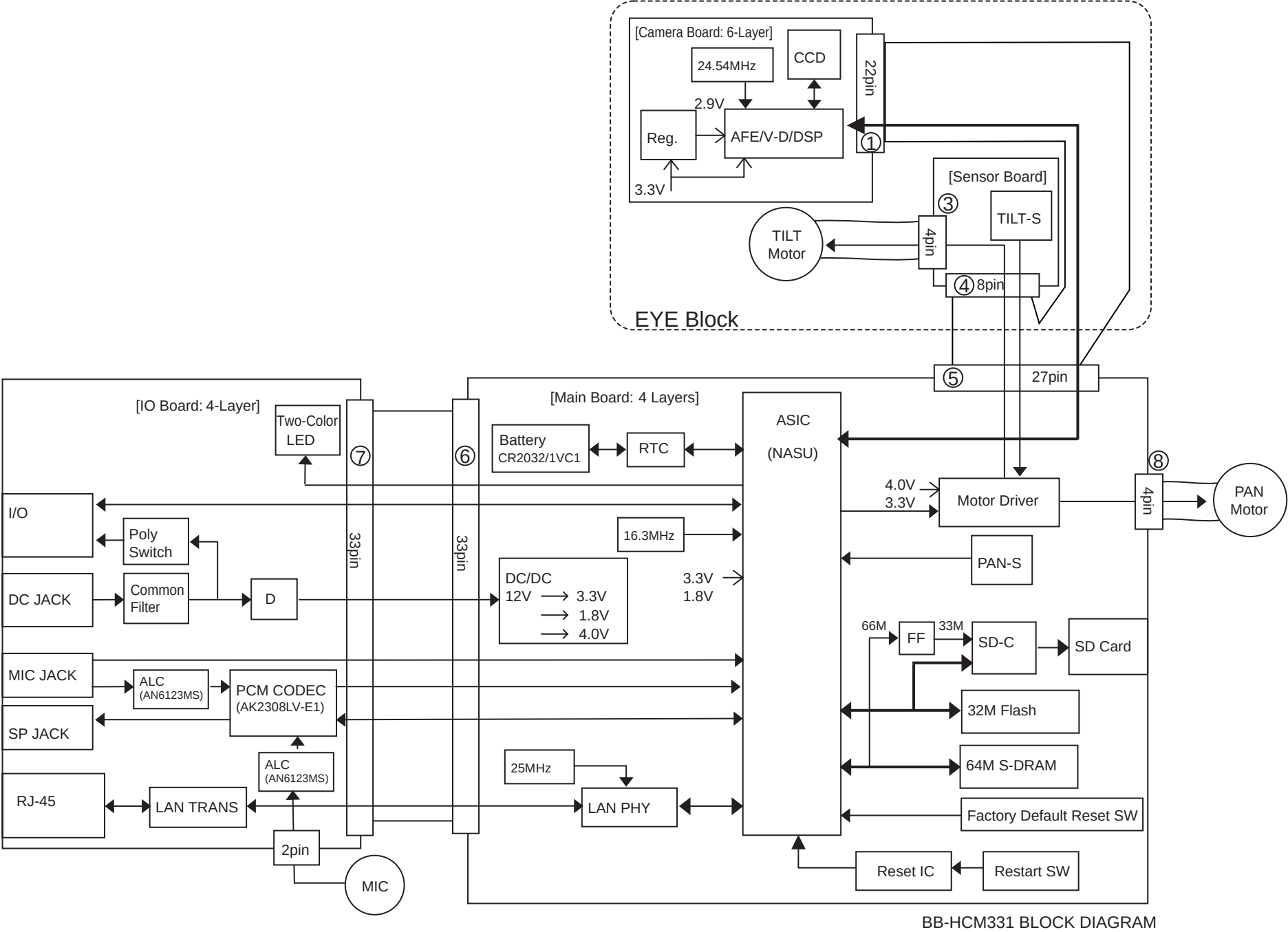



BB-HCM331 MAIN BOARD No.2 (2/2)




BB-HCM331 MAIN BOARD No.1 (1/2)


SDRAM
IC105
IC104
SW102
TP_RESET
TRSTN
TDI
TMS
TCK
TDO
nSRESET
VSYNC
HSYNC
CAMCLK
YUV[7-0]
T_MOT4
T_MOT3
T_MOT2
T_MOT1
P_MOT4
P_MOT3
P_MOT2
P_MOT1
RTCLK
RTCD
RTCE
RTWR
RTINT
DGND
+3.3V
+1.8V




BB-HCM331 BLOCK DIAGRAM